OnGuard®

Hardware Installation Guide

PERPETUAL INNOVATION

LENEL
A UTC Fire & Security Company

Lenel OnGuard® 2010 Technology Update Hardware Installation Guide, product version 6.4
This guide is item number DOC-600, revision 1.071, May 2011

Copyright © 1997-2010 Lenel Systems International, Inc. Information in this document is subject to change without notice. No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without the express written permission of Lenel Systems International, Inc.

Non-English versions of Lenel documents are offered as a service to our global audiences. We have attempted to provide an accurate translation of the text, but the official text is the English text, and any differences in the translation are not binding and have no legal effect.

The software described in this document is furnished under a license agreement and may only be used in accordance with the terms of that agreement. Lenel and OnGuard are registered trademarks of Lenel Systems International, Inc.

Microsoft, Windows, Windows Server, and Windows Vista are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. Integral and FlashPoint are trademarks of Integral Technologies, Inc. Crystal Reports for Windows is a trademark of Crystal Computer Services, Inc. Oracle is a registered trademark of Oracle Corporation. Other product names mentioned in this User Guide may be trademarks or registered trademarks of their respective companies and are hereby acknowledged.

Portions of this product were created using LEADTOOLS © 1991-2010 LEAD Technologies, Inc. ALL RIGHTS RESERVED.

OnGuard includes ImageStream® Graphic Filters. Copyright © 1991-2010 Inso Corporation. All rights reserved. ImageStream Graphic Filters and ImageStream are registered trademarks of Inso Corporation.

Warranty

Lenel warrants that the product is free from defects in material and workmanship under normal use and service with proper maintenance for one year from the date of factory shipment. Lenel assumes no responsibility for products damaged by improper handling, misuse, neglect, improper installation, over-voltages, repair, alteration, or accident. This warranty is limited to the repair or replacement of the defective unit. In no event shall Lenel Systems International be liable for loss of use or consequential damages of any kind, however occasioned.

There are no expressed warranties other than those set forth herein. Warranty expressly excludes third party additions, deletions and/or upgrades to this product, including those contained herein. Lenel does not make, nor intends, nor does it authorize any agent or representative to make any other warranties or implied warranties, and expressly excludes and disclaims all implied warranties of merchantability or fitness for a particular purpose.

Returned units are repaired or replaced from a stock of reconditioned units. All returns must be accompanied by a return authorization number (RMA) obtained from the Lenel customer service department prior to returning or exchanging any product. The RMA number must appear on the outside of the shipping box and on the packing slip. Any items returned without an RMA number will not be accepted and will be returned at the customer's expense. All returns must have transportation, insurance, and custom brokers' fees prepaid.

Liability

It is expressly understood and agreed that the interface should only be used to control exits from areas where an alternative method for exit is available. This product is not intended for, nor is rated for operation in life-critical control applications. Lenel Systems International is not liable under any circumstances for loss or damage caused by or partially caused by the misapplication or malfunction of the product. Lenel's liability does not extend beyond the purchase price of the product.

Table of Contents

Hardware Installation Guidelines 17

1. Inputs, Outputs and Interface Signals 19
   - 1.1 Power Inputs 19
   - 1.2 Alarm Inputs 20
   - 1.3 Reader Inputs/Outputs 20
   - 1.4 Relay Outputs 20
   - 1.5 RS-485 Communication Overview 20
   - 1.6 RS-232 Interfaces 23
2. System Wiring and Other Considerations 24
   - 2.1 General Wiring Considerations 24
   - 2.2 Mounting 29
   - 2.3 Ground Wiring 36
   - 2.4 Alarm Input Wiring 37
   - 2.5 RS-485 Communication Wiring 37
   - 2.6 RS-232 Communication Wiring 40
   - 2.7 Weatherproofing 40
   - 2.8 Relay Contact Protection 41
3. System Turn-Up Considerations 43
   - 3.1 Device Configuration Checks 43
   - 3.2 Ground Potential Difference Checks Before Connecting 44
4. Maintenance 45
   - 4.1 Firmware Updates 45
   - 4.2 AES/Extended Firmware 46
5. UL Certified Installations 47
   - 5.1 Power 49
   - 5.2 Typical Combinations for UL Installations 49
   - 5.3 UL Requirements 52
   - 5.4 Troubleshooting 54

LNL-500 Intelligent System Controller 57

6. Overview of the LNL-500 59
   - 6.1 Interfaces 59
   - 6.2 The Intelligent System Controller Board 59
7. Installation 61

7.1 Wiring 61
8. Configuration 67
8.1 Setting DIP Switches 67
8.2 Installing Jumpers 69
9. Maintenance 70
9.1 Verification 70
9.2 Replace Memory Backup Battery 70
10. Specifications 71

LNL-1000 Intelligent System Controller 73
11. Overview of the LNL-1000 75
11.1 Interfaces 75
11.2 The ISC Board 76
12. Installation 77
12.1 Wiring 77
13. Configuration 84
13.1 Setting DIP Switches 84
13.2 Installing Jumpers 86
14. Maintenance 89
14.1 Verification 89
14.2 Replace Memory Backup Battery 89
15. Specifications 90

LNL-2000 Intelligent System Controller 91
16. Overview of the LNL-2000 93
16.1 Interfaces 93
16.2 The LNL-2000 Board 94
17. Installation 95
17.1 Wiring 95
18. Configuration 102
18.1 Setting DIP Switches 102
18.2 Installing Jumpers 105
19. Maintenance 109
19.1 Verification 109

19.2 Replace Memory Backup Battery 109
20. Specifications 110

LNL-2210 Intelligent Single Door Controller 111

21. Overview of the LNL-2210 113
21.1 The LNL-2210 Board 113
22. Installation 115
22.1 Wiring and Setup 115
22.2 Memory Backup Battery 119
22.3 Installing Jumpers 120
22.4 Setting Dip Switches 120
22.5 Initial IP Addressing Mode 121
22.6 Embedded Web Server 121
22.7 Additional Mounting Information 124
23. Maintenance 126
23.1 Status LEDs 126
24. Specifications 127

LNL-2220 Intelligent Dual Reader Controller 129

25. Overview of the LNL-2220 131
25.1 Interfaces 131
25.2 The IDRC Board 132
25.3 Default Settings 133
26. Installation 134
26.1 Wiring and Setup 134
26.2 Communication Wiring 136
26.3 Reader Wiring 137
26.4 Input Circuit Wiring 139
26.5 Relay Circuit Wiring 140
26.6 Memory Backup Battery 142
26.7 Configuration 142
26.8 Initial IP Addressing Mode 144
26.9 Embedded Web Server 144
27. Maintenance 147
27.1 Verification 147
27.2 Replace Memory Backup Battery 148

28. Specifications 149

LNL-3300 Intelligent System Controller 151

29. Overview of the LNL-3300 153
29.1 Interfaces 153
29.2 The ISC Board 153
29.3 Default Settings 154

30. Installation 155
30.1 Communication Wiring 155
30.2 Power and Alarm Inputs 156
30.3 Memory Backup Battery 156
30.4 Configuration 156
30.5 Initial IP Addressing Mode 158
30.6 Embedded Web Server 159

31. Maintenance 162
31.1 Verification 162
31.2 Replace Memory Backup Battery 163

32. Specifications 164

ISC Communications 165

33. ISC Communication 167
33.1 LAN Connections 167
33.2 LNL-ETHLAN (MSS1/MSS100 Ethernet Controller) 168
33.3 LNL-ETHLAN-MICR (Micro Serial Server) 171
33.4 CoBox Micro 100 173
33.5 CoBox Token Ring Serial Server (LNL-COBOX-201TR) 179
33.6 Lantronix CoBox-DR 184
33.7 Lantronix SecureBox SDS1100/1101 185
33.8 Lantronix UDS-10/UDS100/UDS200/UDS1100 190
33.9 Commonly Used Values 197
33.10 LNL-IC108A/IC109A RS-232 to RS-485 Converter (4-wire) 198
33.11 LNL-IC108A/IC109A RS-232 to RS-485 Converter (2-Wire) 199
33.12 Configuring Two LNL-838A RS-232 to RS-485 Converters 200
33.13 Dial-Up Configuration for the ISC 203
33.14 Securcomm Uniflex DC336 Modems (12 VDC) 207
33.15 KBC Fiber Optic Modem 209
33.16 Comtrol RocketPort Hub Si 210

LNL-1100 Input Control Module 217

34. Overview of the LNL-1100 219
- 34.1 Interfaces 219
- 34.2 The Input Control Module (Series 2) 220

35. Installation 222
- 35.1 Wiring 222
- 35.2 Elevator Control 226

36. Configuration 227
- 36.1 Setting DIP Switches 227
- 36.2 Installing Jumpers 230

37. Specifications 232

LNL-1100-U Input Control Module 233

38. Overview of the LNL-1100-U Board 235
- 38.1 Package Contents 235

39. Installation 236

40. Configuration 237
- 40.1 Setting DIP Switches 237
- 40.2 Installing Jumpers 239
- 40.3 Status LEDs 240

41. Mounting 242

42. Wiring 244
- 42.1 Supervised (Software Configurable) Alarm Inputs 244
- 42.2 Unsupervised Alarm Inputs: Power Fail and External (Cabinet) Tamper 245
- 42.3 Upstream Controller Communication 246
- 42.4 Control Output Wiring 247
- 42.5 Elevator Control 248
- 42.6 Power and Communications 249
- 42.7 UL Listed Installations 250

43. Specifications 251

LNL-1200 Output Control Module 253

44. Overview of the LNL-1200 255

44.1 Interfaces 255
44.2 The Output Control Module (Series 2) 256
45. Installation 258
45.1 Wiring 258
45.2 Elevator Control 260
46. Configuration 262
46.1 Setting DIP Switches 262
46.2 Installing Jumpers 265
47. Specifications 267

LNL-1200-U Output Control Module 269

48. Overview of the LNL-1200-U Board 271
48.1 Package Contents 271
49. Installation 272
50. Configuration 273
50.1 Setting DIP Switches 273
50.2 Installing Jumpers 275
50.3 Status LEDs 276
51. Mounting 279
52. Wiring 281
52.1 Unsupervised Alarm Inputs: Power Fail and External (Cabinet) Tamper 281
52.2 Upstream Communication 282
52.3 Relay Outputs 282
52.4 Elevator Control 284
52.5 Power and Communications 285
52.6 UL Listed Installations 286
53. Specifications 287

LNL-1300 Single Reader Interface Module 289

54. Overview of the LNL-1300 291
54.1 Interfaces 291
54.2 The Single Reader Interface Module Board (Series 2) 292
55. Installation 294
55.1 Wiring 294
55.2 Elevator Control 299

56. Configuration 301
56.1 Installing Jumpers 301
57. Specifications 305

LNL-1300-U Single Door Controller Module 307
58. Overview of the LNL-1300-U Board 309
58.1 Package Contents 309
59. Installation 310
60. Configuration 311
60.1 Setting DIP Switches 311
60.2 Installing Jumpers 313
60.3 Status LEDs 314
61. Mounting 317
62. Wiring 319
62.1 Supervised (Software Configurable) Alarm Inputs 319
62.2 Upstream Communication 320
62.3 Relay Outputs 321
62.4 Downstream Reader Communication 322
62.5 Open Supervised Device Protocol 323
62.6 Elevator Control 324
62.7 External (Cabinet) Tamper 325
62.8 Power and Communications 325
62.9 UL Listed Installations 326
63. Specifications 327

LNL-1320 Dual Reader Interface Module 329
64. Overview of the LNL-1320 331
64.1 Interfaces 331
64.2 The Dual Reader Interface Module (Series 2) 332
65. Installation 335
65.1 Wiring 335
65.2 Elevator Control 342
66. Configuration 344
66.1 Setting DIP Switches 344
66.2 Installing Jumpers 347

67. Specifications 348

LNL-1320-U Dual Door Controller Module 349

68. Overview of the LNL-1320-U Board 351
68.1 Package Contents 351
69. Installation 352
70. Configuration 353
70.1 Setting DIP Switches 353
70.2 Installing Jumpers 356
70.3 Status LEDs 357
71. Mounting 361
72. Wiring 363
72.1 Supervised (Software Configurable) Alarm Inputs 363
72.2 Upstream Communication 364
72.3 Control Output Wiring 365
72.4 Downstream Reader Communication 366
72.5 Open Supervised Device Protocol 367
72.6 Unsupervised Alarm Inputs: Power Fail and External (Cabinet) Tamper 368
72.7 Power and Communications 368
72.8 UL Listed Installations 369
73. Specifications 370

LNL-8000 Star Multiplexer 373

74. Overview of the LNL-8000 Board 375
74.1 Interfaces 375
74.2 The Star Multiplexer Board 376
75. Installation 377
75.1 Wiring 377
75.2 Wiring and Termination 379
76. Configuration 381
76.1 Setting DIP Switches 381
76.2 Installing Jumpers 382
77. Specifications 383

LNL-2005W Magnetic Card Access Reader 385

78. Overview 387

79. Installation 388

79.1 Wiring 388
79.2 Mounting the Reader 388
79.3 Weatherproofing the Reader 388

80. Configuration 390

80.1 DIP Switch/Jumper Setting 390
80.2 TTL Interface 390
80.3 Grounding the Reader 391
80.4 Reader Verification 391
80.5 Status LEDs 391
80.6 Maintenance 391
80.7 Product Identification 392

81. Specifications 393

81.1 Reader Mounting Dimensions 394
81.2 Reader Weather Shield 396

LNL-2010W/2020W/2020W-NDK/NDKV2 Magnetic Card Access Reader 397

82. Overview 399

83. Installation 400

83.1 Wiring 400
83.2 Mounting the Reader 400
83.3 Connecting the Keypad (LNL-2020W/NDK/V2 only) 400
83.4 Weatherproofing the Reader 401

84. Configuration 403

84.1 Standard Format Code Summary 403
84.2 DIP Switch/Jumper Setting 404
84.3 Keypad Data and Tamper Monitor Signaling 405
84.4 TTL Interface 405
84.5 Grounding the Reader 406
84.6 Reader Verification 406
84.7 Status Indicators 406
84.8 Maintenance 407
84.9 Product Identification 407

85. Specifications 408

85.1 Reader Mounting Dimensions 409
85.2 Reader Weather Shield 411

LenelProx Readers 413

86. LenelProx Readers 415
86.1 Read Range 415
86.2 Installation Guidelines 415
86.3 LenelProx LPMM-6800 417
86.4 LenelProx LPSP-6820 419
86.5 LenelProx LPKP-6840 and BT-LPKP-NDK 422
86.6 LenelProx LPSR-2400 426
86.7 LenelProx LPRKP-4600 429
86.8 LenelProx LPMR-1824 and LPMR-1824 MC 433
86.9 LenelProx LPLR-911 439

Lenel Keypads 447

87. Lenel Keypads 449
87.1 LNL826S121NN 8-bit Output Keypad Reader 449
87.2 Reader Specifications 451

Lenel OpenCard Readers 453

88. Lenel OpenCard Readers 455
88.1 OpenCard ISO-X Readers 455
88.2 OpenCard XF1550/XF1560 457
88.3 Specifications 459

LNL-500B Biometric Reader Interface 461

89. Overview of the LNL-500B 463
89.1 Interfaces 463
89.2 The Biometric Reader Interface Board 464

90. Installation 465
90.1 Wiring 465

91. Configuration 470
91.1 Setting DIP Switches 470
91.2 Installing Jumpers 472
92. Maintenance 473
92.1 Verification 473
92.2 Memory Backup Battery 473
92.3 Firmware 473
93. Supported Biometric Readers 474
94. Specifications 475

HandKey Readers 477

95. Schlage HandKey Readers 479
95.1 HandKey CR, II, and ID3D-R 479
95.2 MIFARE/iCLASS HandKey Reader 492

Biocentric Solutions 499

96. Overview 501
96.1 Interfaces 501
97. Enrollment Readers 502
97.1 Wiring Enrollment Readers 502
97.2 Configuring Enrollment Readers 504
97.3 Encoding Smart Cards 504
98. Verification Readers 505
98.1 Wiring CombiSmart Readers 505
98.2 Wiring GuardDog Readers for Verification 509
99. Maintenance 511
99.1 Tips and Tricks 511

Bioscrypt Readers 517

100. Overview 519
100.1 V-Pass FX and V-StationA 519
100.2 V-Smart and V-StationG/H 521

101. Installation 523
101.1 Reader Power Requirements 523
101.2 Enrollment Readers 523
101.3 V-Pass FX 525
101.4 V-StationA 529
101.5 V-Smart 534
101.6 V-StationA-G and V-StationA-H 547
101.7 PIV-Station 554
101.8 V-Station and V-Flex 4G Readers 556

Schlage Wireless Readers 563

102. Overview of Wireless Reader Interfaces 565
102.1 Interfaces 565
103. Installation of the Gateway 566
103.1 Wiring 566
104. Configuration 570
104.1 Setting DIP Switches 570
104.2 Installing Jumpers 572
104.3 Firmware 572
105. Schlage Wireless Configuration 573
105.1 PIM-485-16-OTD 573
105.2 Configuration and Demonstration Tool 573
105.3 PIM-OTD 574
106. Readers 577
106.1 Use with the LNL-2020W 577
106.2 OnGuard Configuration 577
107. Specifications 579

Schlage Wireless Locks 581

108. Overview of Wireless Lock Interfaces 583
108.1 Interfaces 583
109. Installation of the LNL-500W 584
109.1 Wiring 584
110. Configuration 588
110.1 Setting DIP Switches 588

110.2 Installing Jumpers 590
110.3 Firmware 590
111. Schlage Wireless Configuration 591
111.1 PIM400-485 591
111.2 Configure the PIM400-485 and AD-400 Wireless Lock Range Addresses 591
111.3 AD-400 Wireless Locks 593
111.4 Handheld Device (HHD) 594
111.5 Synchronization Software 594
111.6 Install the Schlage Utility Software (SUS) 595
111.7 Link the Wireless Lock to the PIM 596
111.8 Connect the HHD to the Lock 598
111.9 Use the HHD to Couple to the Lock 598
112. Wiring and Setup 600
113. Locks 603
113.1 OnGuard Configuration 603
114. Specifications 605

Command Keypad 607
115. Command Keypad Overview 609
115.1 Communication 609
115.2 Specifications 621

Index 623

HARDWARE INSTALLATION GUIDELINES

1 Inputs, Outputs and Interface Signals

Hardware products operate from various power sources and communicate via a variety of I/O interfaces. Understanding the power requirements and interface signals, their characteristics, merits and limitations will insure successful installation and a reliable system.

1.1 Power Inputs

1.1.1 AC Power

Some OnGuard hardware products can use an AC power source.

The AC power wiring to power supplies consists of the AC LINE (L), AC NEUTRAL (N), and SAFETY GROUND (G). These lines from the AC power source to the power input terminals must not be interchanged.

Interchange of the AC LINE and AC NEUTRAL exposes components within the power supply to the hot side of the input power even if the AC line switch is turned off. This presents a safety hazard.

Interchange of the AC LINE and SAFETY GROUND places the supply chassis to an AC potential equal to the input voltage. This could result in a lethal shock hazard or equipment damage.

The interchange of the AC NEUTRAL and SAFETY GROUND may result in ground current flowing through the power supply chassis and other ground paths, causing unreliable/improper system operation.

The AC LINE input to Hardware power supplies is appropriately fused and switched. Local safety regulations may require an additional switch/fuse to be installed in the NEUTRAL input.

Do not apply greater than 12 VAC ± 15% to any hardware product.

1.1.2 DC Power

All OnGuard hardware products can use a DC power source.

When using a DC power supply for a hardware product, the DC power must be isolated electrically from the AC input side and non-switching, regulated DC power. Readers require +5 or +12 VDC, and all other panels require either 12 VDC or 12 VAC (except the LNL-1300 and LNL-8000 which require only 12 VDC).

DC power must be supplied through a diode for reverse polarity protection, and must be filtered and regulated for the electronics. Products intended to be powered from DC should never be powered with an AC transformer with rectifiers.

The Multiplexer requires a regulated, low ripple (under 20 mV P/P). The power input is fused and protected from polarity reversal, and a crowbar over-voltage circuit protects against application of wrong voltages.

Do not apply greater than 12 VDC ±15% to any hardware product.

To insure reliable operation of all components of the system, it is important that all power supplies used to power the devices are completely isolated from the AC power source.

1.2 Alarm Inputs

1.2.1 Unsupervised Alarms

Unsupervised alarm inputs sense simple contact closure. Open circuit results in an alarm condition. These inputs are protected by pull-ups, series limiting resistors, and clamp diodes against transients, like ElectroStatic Discharge. The signal is then buffered to reduce the effect of noise.

Open contacts should result in terminal voltages of 3.5 to 5 VDC. Closed contact terminal voltage should be between 0 and 0.8 VDC.

1.2.2 Supervised Alarms

Various OnGuard hardware products provide contact supervision. These inputs require an end-of-line (EOL, 1K±10%) terminator to be installed with the contact to be monitored. This can be configured within the software. Input protection is similar to that of the unsupervised input, however the input is also filtered to reject 50/60 Hz AC coupling.

The supervised input can sense contact conditions of SAFE, ALARM, and FAULT. It also accommodates normally closed (NC) and normally open (NO) contacts, which is configurable within the application.

1.3 Reader Inputs/Outputs

1.3.1 Reader Data Input

Reader data input is similar to unsupervised alarm input. Reader data input interfaces to reader DATA 1/ DATA 0 (WD1/WD0) open collector signals and produces a nominal signal swing of 0 to 5 volts.

1.3.2 Open Collector Output

Open collector output is used by readers to send reader data DATA1/DATA0 (WD1/WD0) and to control external LEDs. Pull-up resistors and diode clamps are provided for reader data outputs. This type of interface is limited to 500 feet (152.4 m).

1.4 Relay Outputs

Some Lenel hardware products provide form C relay contact outputs. These are dry contacts that are capable of switching signals as well as higher current loads. However, once they are used to switch current (for example, a door strike), they can not be used reliably to switch small signals (for example, dialer input.)

1.5 RS-485 Communication Overview

The EIA RS-485 standard defines an electrical interface for multi-point communication on bus transmission lines. It allows high-speed data transfer over extended distance (4000 feet/1219 m.) The RS-485 interface

uses a balanced differential transmitter/receiver to reject common mode noise. The following table is a comparison of interfaces commonly used in access/alarm systems.

	RS-485	RS-232C	Modem	20mA Loop
Mode of Operation:	Differential DC coupled	Single-ended DC coupled	Differential AC coupled	Single-ended current
DC Isolation:	No	No	Yes	Usually Isolated
Distance:	4000 feet	50 feet	Phone Line	1000 feet
No. of Devices on 1 Line:	32	2	2	Limited by Loop Voltages
Data Rate:	10M bps	20K bps	19.2K bps	2400 bps

Unlike the RS-232C or current loop interfaces, the RS-485 interface allows multiple devices to communicate at high data rates on a single cable, over long distance. Obviously, the RS-485 interface provides advantages in cost savings for installation and improved system performance, but it also brings about problems which would not commonly be seen on systems using RS-232C or current loop interfaces.

Using long communication cable with multiple devices often necessitates powering devices from different power sources. This can result in ground faults and ground loops, which can cause communication problems and possible equipment damage. Because the RS-485 interface communicates in the base band and provides no DC isolation, ground fault places devices at different electrical ground levels and causes large ground currents to flow. Possibilities of ground fault call for careful system planning and installation verification.

Communication cables exceeding 4000 feet can also create noise and signal reflection problems if proper cable is not used or if the cable is not correctly terminated.

Belden Wire Specifications

Trade Number UL NEC Type CSA Certification	Number of Pairs	Nominal D.C. R. Conductor	Shield	Nominal Impedance (Ohms)	Nominal Capacitance	
					pF/feet	pF/meter
9841 NEC CM CSA	1	24.0 ohms/M 78.7 ohms/ km	3.35 ohms/M 11.0 ohms/K	120	12.8	42
9842 NEC CM CSA	2	24.0 ohms/M 78.7 ohms/ km	2.2 ohms/M 7.2 ohms/K	120	12.8	42
88102 NEC CMP CSA	2	24.0 ohms/M 78.7 ohms/ km	15.5 ohms/M 50.9 ohms/km	100	12.95	42

Cable Cross Reference Table

Purpose	Cable type	Gauge	Cond.	Description	Belden number	South West number	WCW part number	WP number
RS-485, 2-wire	Non-plenum	24	2P	overall shield	9842	170105	C4842	D4852
RS-485, 2-wire	Plenum	24	2P	overall shield	82842, 89842	n/a	n/a	n/a
RS-485, 4-wire	Non-plenum	24	3P	overall shield	9843	n/a	n/a	n/a
RS-485, 4-wire	Plenum	24	3P	overall shield	88103	110060	42003	n/a
RS-232	Non-plenum	24	5	overall shield	9610	170155	C0953	n/a
	Plenum	24	6	overall shield	83506	110070P	C3165	n/a
Reader drops	Non-plenum	22/24	6	overall shield	5504FE, 9536	161240	C0743	3270
	Plenum	22/24	6	overall shield	6504FE	110253P	444351-04	253270B
12 VDC power	Non-plenum	18	2	overall shield	5300FE, 8760	163004	414109	293
	Plenum	18	2	overall shield	6300FE, 88760	112000P	442320	25293B

1.5.1 RS-485 Cable

Field hardware products that are series 1 use 4-wire or 2-wire RS-485 full communication between devices. Only 2-wire RS-485 cable configuration can be used for series 2. The main run RS-485 cable used must be shielded, low capacitance, stranded, two twisted pairs with 100-ohm characteristic impedance or better (Belden 9842 4-wire or 9841, 2-wire, plenum cabling Belden 88102, West Penn, or equivalent). Wire size is 24 AWG minimum. Total length of the communication cable must not exceed 4000 feet (1219 m) for 24 AWG wire size per leg of the communication tree.

Drops (down leads or stubs) to readers and other devices must be kept as short as possible (no longer than 10 feet). Use shielded 24 AWG cable (Belden 9502, or equivalent), when terminating to the 3-position for 2-wire RS-485 or the 5-position for 4-wire RS-485, insulation displacement connector.

1.5.2 Use of Signal Ground (SG)

The signal ground (SG) provides a common mode signal reference for the communicating devices. Each device must connect its SG to the cable shield drain wire. Failure to use the SG connection may cause

communication errors. If the environment is known to be noisy, an additional wire may be used for the signal ground. The shield can then be grounded at one end only (to prevent ground loops) as a signal ground.

1.5.3 Device to Device Connection

Communication cables for RS-485 should be laid out in a daisy chain. Long stubs (T connection) should be avoided because they create discontinuities and degrade signals. DO NOT connect devices in STAR configuration unless using the LNL-8000 Star Multiplexer. STAR connection creates long stubs and causes difficulty in cable termination.

1.5.4 Cable Termination

RS-485 communications is designed for higher data transmission speeds and also simplifies installation by allowing each device to be multi-dropped from a single communication line or bus. With the increase data speeds and transmitting and receiving the data over a single communications line, there is higher risk of external noise. External noise could be in the form of line impedance, line ringing, or RF interference. When using the specified communications cabling the risk of noise is all but eliminated. To ensure that the data is sent and received without error, some End-of-Line termination of the RS-485 bus may be required.

- **RS-485 Cable termination from Host to Controller** The device used to convert RS-232 communication to RS-485 determines the termination necessary for this segment of the RS-485 communication bus. These communications devices, pre-bias the RS-485 signal, which marks the state of the signal being sent and allows the line to flow for reliable communications. This is true for most devices that are used for Host to ISC communications, but any device that has been approved by Lenel will indicate how termination should be configured for proper operation in its documentation. Refer to the specific device diagrams being used in the following sections of this hardware manual.

- **RS-485 Cable termination from controller to down stream modules (LNL-500X, 1100, 1200, 1300, 1320, 4000, 8000)** Termination of this section of the RS-485 bus always remains the same. Each end of the RS-485 bus must be terminated using the on-board jumpers provided with each piece of OnGuard hardware. Please refer to the termination drawings for each component being installed in this hardware manual.

- **RS-485 Cable termination from LNL-500X to Third-party hardware devices** Termination may be different for each RS-485 hardware device that is connected to the LNL-500X interface gateway module. Please refer to the gateway model being used for the hardware installation application.

1.6 RS-232 Interfaces

A number of products provide RS-232C interface for communication. This interface is intended for short distance communication because its high impedance is more susceptible to noise. Cable length is generally limited to 50 feet (15m.) If required, this distance may be extended to a few hundred feet by using low capacitance shielded cables.

2 System Wiring and Other Considerations

Proper installation is essential to the safe and reliable operation of the OnGuard system. Improper or incorrect wiring will lead to unreliable operation or damage to system components. When system components are powered by different power sources, great care must be exercised in planning and wiring the system. The following paragraphs provide some guidelines for successful system interconnection.

2.1 General Wiring Considerations

There are different system wiring considerations for different groups of wiring, depending on the signal levels the wires are to carry. System wires can be generally separated into the following groups:

- Power distribution wires
- Data communication wires
- Sensor wires.

To avoid cross-talk, follow the wire requirements for each type of communication, or use different conduit for different signal groups.

2.1.1 Device Placement

Observe the distance limitation of each type of signal when planning device placement. Modems and line extenders can be used for extended distance.

Do not run any wires near utility AC power wiring, lightning rod grounding wire, etc. to avoid externally generated transients. Grounding is required for ESD protection and safety.

2.1.2 Power Requirements

When planning a system, know the power requirement of each device. If multiple devices are to share a common power supply, care must be exercised to avoid excessive voltage loss on the wires. Voltage loss can lead to communication problems when devices are talking/listening on different grounds.

Voltage loss is directly proportional to wire resistance and the current the wire carries. Place the power supply as close to the equipment as possible. Select appropriate wire size for the load.

2.1.3 Current Overload

When designing any system, you must know the power requirement of each component being used within that system (refer to power chart below) as well as the actual output of the power supplies being used. If multiple devices are to share a common power supply, care must be taken to avoid excessive voltage loss through the power transmitting wires. Voltage loss can lead to intermittent communications problems when devices are consuming more power than the power supply is able to give. Other causes of voltage loss are directly proportional to wire resistance and current that the wire carries. When designing a system, place the power supply as close to the equipment as possible. The farther away the equipment is from the power supply, the larger the gauge of wire needed to ensure adequate current is being supplied at the device. Be sure to select the appropriate wire size for the distance between the power source and the equipment.

When choosing a power supply be sure never max out the current load of the supply. Always use a 25% overage factor when sizing your supply as a safety operation. Always use an isolated, non-switching, regulated power supply.

2.1.4 Power Requirements Table

Device	Power Required
ACCESS HARDWARE	
LNL-500	12 VAC (10.2-13.8 V), 400 mA RMS or 12 VDC (10.8-13.2 V), 250 mA
LNL-1000	12 VAC (10.2-13.8 V), 600 mA RMS or 12 VDC (10.8-13.2 V), 350 mA
LNL-2000	12 VAC (10.2-13.8 V), 650 mA RMS (800 mA RMS with NIC) or 12 VDC (10.8-13.2 V), 400 mA (550 mA with NIC)
LNL-2210	12 VDC ± 10%, 200 mA minimum, 900mA maximum PoE power input 12.95W, compliant to IEEE 802.3af For UL installations, PoE powered devices shall not be used; power for these devices must be provided by a UL294 Listed source (12 VDC).
LNL-2220	12 to 24 VDC ± 10%, 500 mA maximum (plus reader current) 12 VDC @ 250 mA (plus reader current) nominal 24 VDC @ 150 mA (plus reader current) nominal
LNL-3300	12 to 24 VDC ± 10%, 300 mA maximum 12 VDC @ 240 mA (325mA with CoBox-Micro) nominal 24 VDC @ 135 mA (175mA with CoBox-Micro) nominal
LNL-1100	12 to 24 VDC ± 10%, 350 mA maximum 12 VDC @ 300 mA nominal 24 VDC @ 220 mA nominal
LNL-1100-U	**Note:** For UL installations, refer to section UL Listed Installations on page 250 for this device. 12 to 24 VDC ± 10% 12 VDC @ 300 mA nominal 24 VDC @ 150 mA nominal
LNL-1200	12 to 24 VDC ± 10%, 1100 mA maximum 12 VDC @ 850 mA nominal 24 VDC @ 450 mA nominal

Device	Power Required
LNL-1200-U	**Note:** For UL installations, refer to section UL Listed Installations on page 286 for this device. 12 to 24 VDC ± 10% 12 VDC @ 805 mA nominal 24 VDC @ 407 mA nominal
LNL-1300	12 to 24 VDC ± 10%, 150 mA maximum (plus reader current) 12 VDC @ 110 mA (plus reader current) nominal 24 VDC@ 60 mA (plus reader current) nominal
LNL-1300-U	**Note:** For UL installations, refer to section UL Listed Installations on page 326 for this device. 12 to 24 VDC ± 10% 12 VDC @ 700mA (includes reader current) nominal 24 VDC@ 350 mA (includes reader current) nominal
LNL-1320	12 to 24 VDC ± 10%, 550mA maxiumum (plus reader current) 12 VDC @ 450 mA (plus reader current) nominal 24 VDC @ 270 mA (plus reader current) nominal
LNL-1320-U	**Note:** For UL installations, refer to section UL Listed Installations on page 369 for this device. 12 to 24 VDC ± 10% 12 VDC @ 1200 mA (includes reader current) nominal 24 VDC @ 600 mA (includes reader current) nominal
LNL-2005W	12 VDC (10.2 to 13.8VDC), 50 mA
LNL-2010W	12 VDC (10.2 to 13.8VDC), 80 mA
LNL-2020W	12 VDC (10.2 to 13.8VDC), 80 mA
LNL-8000	12 VDC, 250 mA
Indala Proximity	
ASR-505	5-14 VDC, 45 mA
ASR-110	10.5-14 VDC, 180 mA
ASR-112	10.5-14 VDC, 180 mA
ASR-603	4 -16 VDC, 350 mA
ASR-605	4 -16 VDC, 350 mA

Device	Power Required
ASR-610	4 -14 VDC, 500 mA
ASR-620	12 - 24 VDC, 900 mA-1.2 A
ASR-136	24 VDC, 400 mA
ASR-500	5-14 VDC, 45 mA
ARK-501	5-14 VDC, 50 mA
Essex Keypads	
KTP-16212SLI	12 VDC, 15 or 85 mA
KTP-163SN	12 VDC, 15 or 85 mA
HID Proximity	
5365	5-16 VDC, 160 mA
5355	10-28 VDC, 160 mA
5395	4-16 VDC, 160 mA
5375	24 VDC, 1.7 A
5385	24 VDC, 50 mA
6000	24 VDC, 2.0 A
6030	10-28 VDC, 150 mA
HID Wiegand	
SRE-3100500	5-12 VDC, 40 mA
SRE-3100130	5-12 VDC, 40 mA
SRE-3102500	5-12 VDC, 60 mA
HID iCLASS	
6100	10-16 VDC, 80-300 mA @ 12 VDC
6110	10-16 VDC, 80-300 mA @ 12 VDC
6120	10-16 VDC, 80-260 mA @ 12 VDC
6130	10-16 VDC, 72-244 mA @ 12 VDC
6111	10-16 VDC, 80-300 mA @ 12 VDC
6121	10-16 VDC, 100-350 mA @ 12 VDC
6131	10-16 VDC, 72-244 mA @ 12 VDC
6125A	5-12 VDC, 70-120 mA @ 12 VDC
Lenel OpenCard	
LNL-XF1100D	6-16 VDC, 95-254 mA

Device	Power Required
LNL-XF2100D	8-16 VDC, 95-218 mA
LNL-XF2110D	8-16 VDC, 120-215 mA

Typical door strike power is estimated at 24 VDC, 300 mA, consult manufacturer specifications for actual values.

Note: Device power requirements are subject to change without notice. These tables are intended only as a guide.

FIELD HARDWARE POWER SUPPLIES AVAILABLE

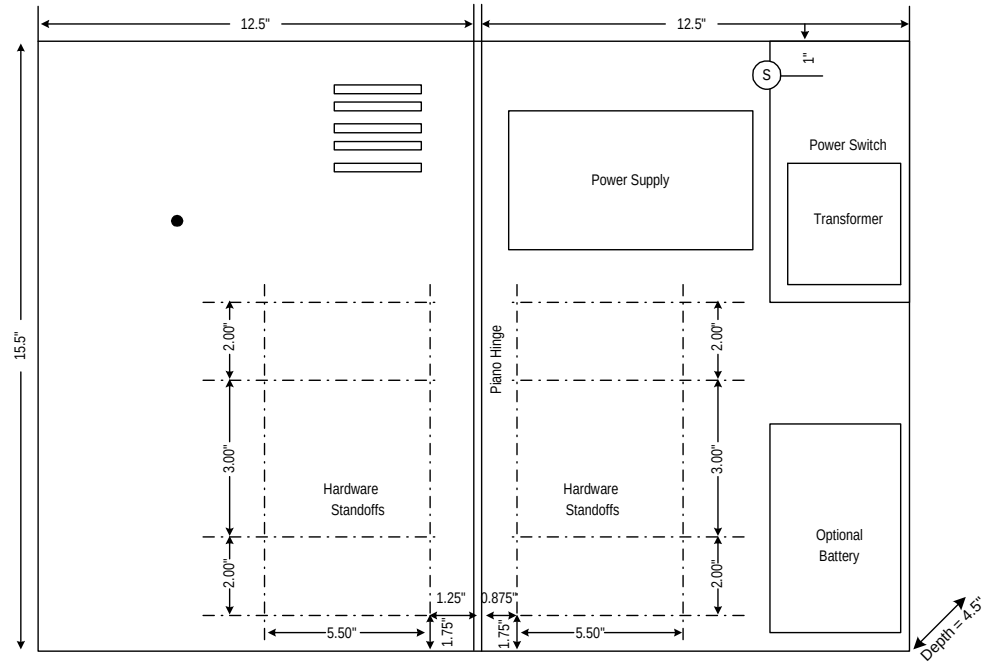
Part #	Description
LNL-AL400ULX	UL Listed power supply - 12 VDC (4A output) or 24 VDC (3A output), switch selectable, 120 VAC input, continuous supply current with enclosure, lock and open frame transformer, UPS capable (battery optional). The AL400ULX is a power limited supply/chargers that will convert a 28 VAC input, into a power limited 12 VDC or 24 VDC output. Operating temperature: 0° to +49° C (32° to 120° F). Humidity: 0 to 85% RHNC. BTU output: 33 BTU.
LNL-400X-CE220	CE marked power supply - 12 VDC (4A output) or 24 VDC (3A output), switch selectable, 230 VAC input, continuous supply current with enclosure, lock and open frame transformer, UPS capable (battery optional). Operating temperature: 0° to +49° C (32° to 120° F). Humidity: 0 to 85% RHNC. BTU output: 33 BTU.
LNL-AL600ULX-4CB6	UL Listed power supply - 12 VDC or 24 VDC 6A output (switch selectable), 120 VAC input, continuous supply current with enclosure, lock and open frame transformer, UPS capable (battery optional). Operating temperature: 0° to +49° C (32° to 120° F). Humidity: 0 to 85% RHNC. BTU output: 49 BTU.
LNL-600X6-CE220	CE marked power supply - 12 VDC or 24 VDC 6A output (switch selectable), 230 VAC input, continuous supply current with enclosure, lock and open frame transformer, UPS capable (battery optional). Operating temperature: 0° to +49° C (32° to 120° F). Humidity: 0 to 85% RHNC. BTU output: 49 BTU.
LNL-CTX	Hardware enclosure (12 x 16 x 4.5 inches) with lock and tamper switch support up to two Lenel access hardware modules (UL approved).
LNL-CTX-6	Hardware enclosure (18 x 24 x 4.5 inches) with lock and tamper switch support up to six Lenel access hardware modules (UL approved).
ABT-12	Battery Kit, 12 VDC, 12AH Battery (PS-12120).

For a complete listing of our products, consult the Lenel Price Book.

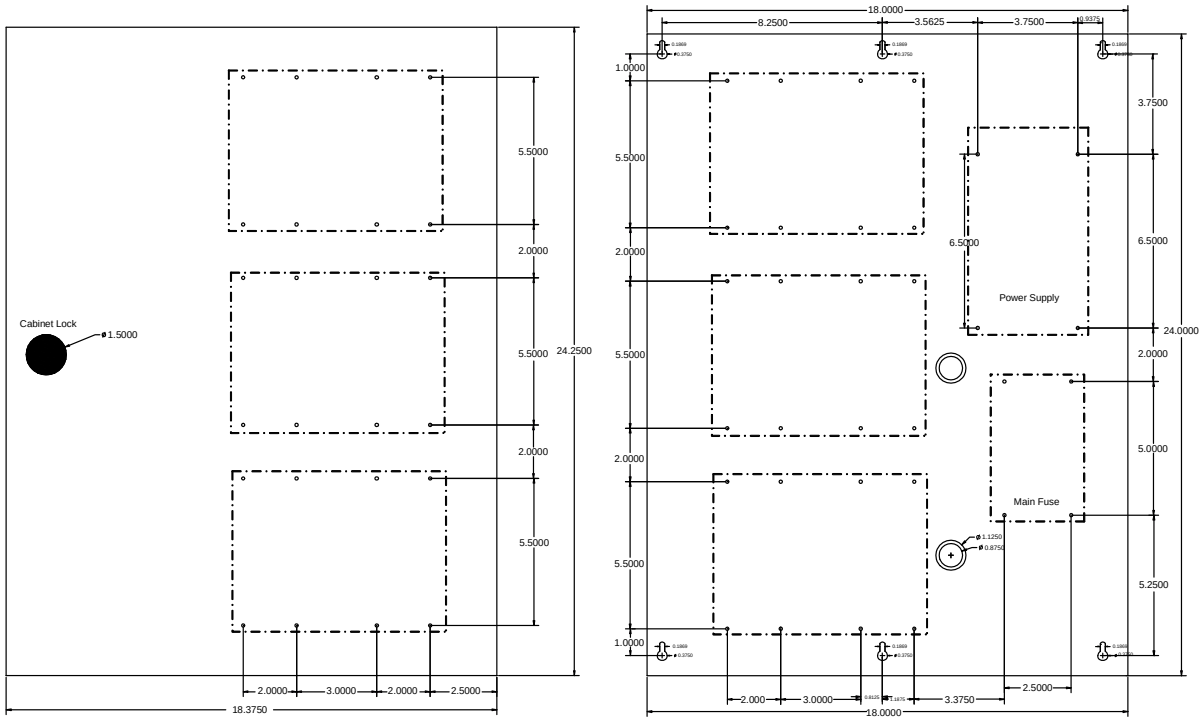
2.2 Mounting

Most modules are 6 x 8 inches in size, with mounting holes along the long edge. Up to two (2) units can be mounted in a single LNL-CTX enclosure. The LNL-CTX-6 allows for up to six (6) modules.

LNL-CTX

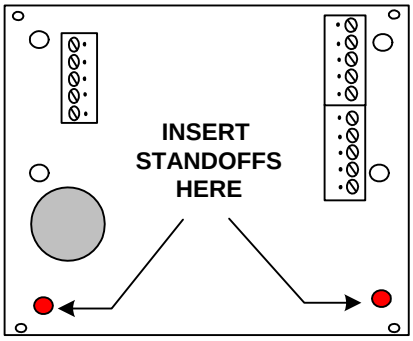


LNL-CTX-6



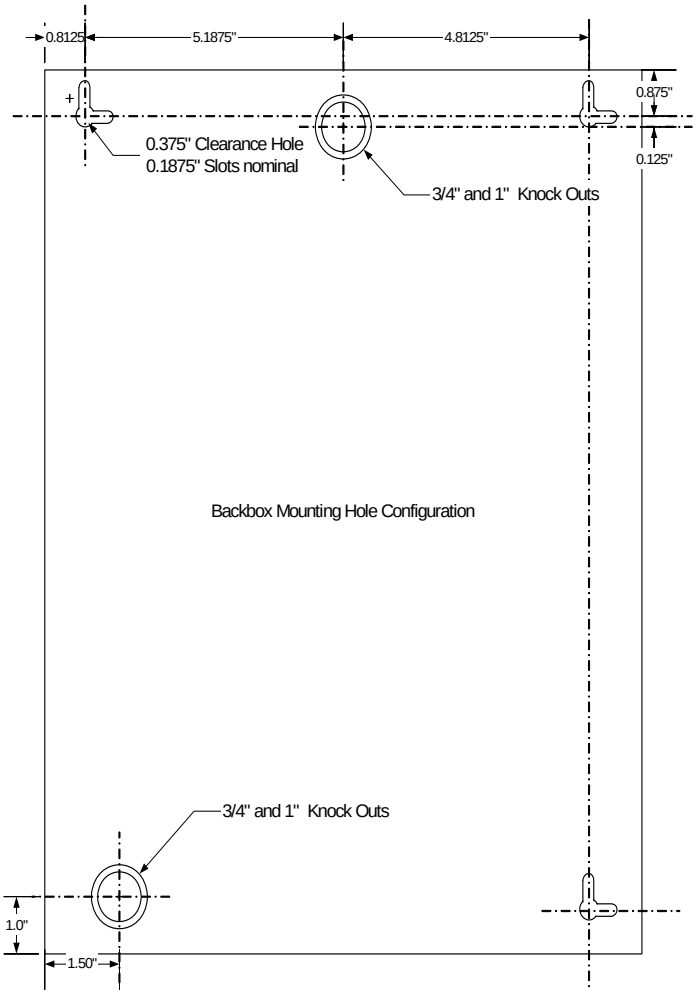
For smaller modules, only four of the mounting holes are used, the last two holes need support standoffs which come installed from the factory. The exception is the single reader interface module — up to eight (8) units can be mounted in any standard 2-gang or 3-gang junction enclosure.

The standoffs for the hardware come in a separate package. The diagram below illustrates positioning.

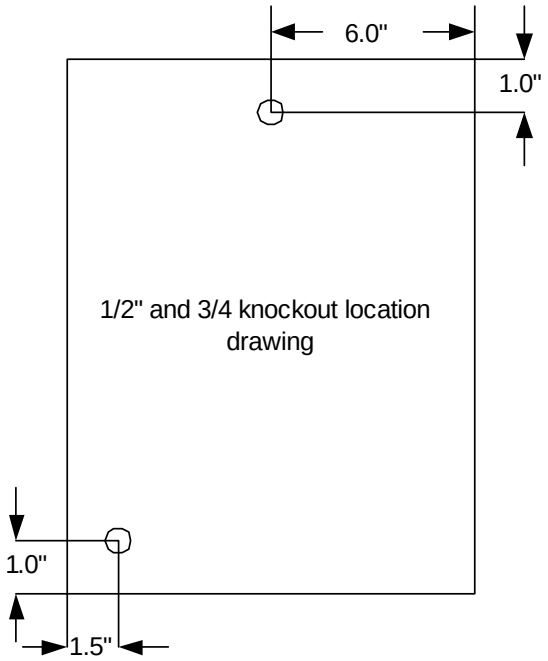


DO NOT DISPOSE
[QTY 2]

LNL-CTX knockout diagram



LNL-CTX knockout location drawing



2.2.1 LNL-AL400ULX Installation

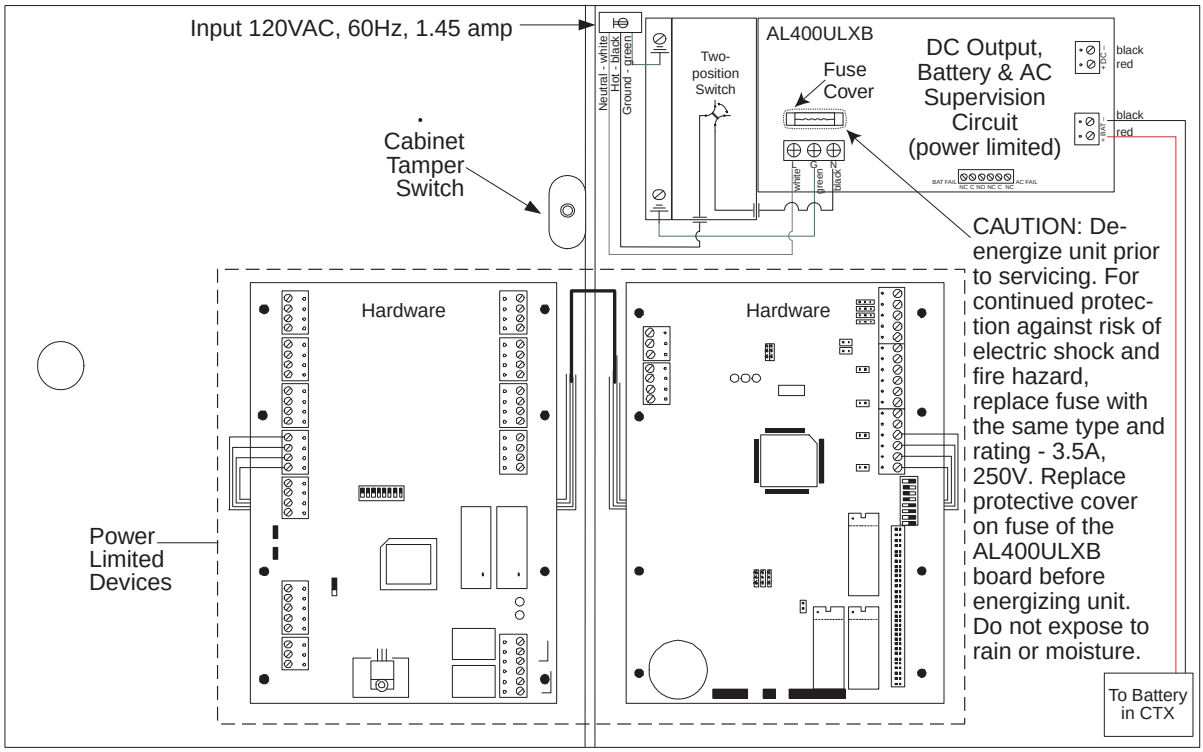
The LNL-AL400ULX should be installed in accordance with article 760 of the National Electrical Code and NFPA70 as well as all applicable local codes.

Power Supply Voltage Output Selections

Output	Switch position
12 VDC	SW 1 closed
24 VDC	SW 1 open

1. Mount the enclosure in desired location.

2. Connect unswitched AC power (120 VAC/60 Hz) to terminals marked L, G, N, dedicated to the Burglar Alarm/Access Control Subsystem.


Input 120VAC, 60Hz, 1.45 amp
Neutral - white
Hot - black
Ground - green
Two-position Switch
AL400ULXB
Fuse Cover
DC Output, Battery & AC Supervision Circuit (power limited)
black
red
black
red
white
green
black
Cabinet Tamper Switch
CAUTION: De-energize unit prior to servicing. For continued protection against risk of electric shock and fire hazard, replace fuse with the same type and rating - 3.5A, 250V. Replace protective cover on fuse of the AL400ULXB board before energizing unit. Do not expose to rain or moisture.
Hardware
Hardware
Power Limited Devices
To Battery in CTX

3. Secure the green wire lead to earth ground. Use 18 AWG or larger for all power connections (Battery, DC output). Keep power limited wiring separate from non-power limited wiring (120 VAC/60 Hz Input, Battery Wires). A minimum of 0.25 inch spacing must be provided between power wires.

4. Connect devices to be powered to terminals marked + DC –.

Note: It is important to measure output voltage before connecting devices. This helps avoid potential damage.

5. For UL Access Control applications, batteries are required. When batteries are not used, a loss of AC will result in the loss of output voltage. When using stand-by batteries, they must be lead acid or gel type. Connect battery to terminals marked + BAT – (battery leads included). Use two 12 VDC batteries connected in series for 24 VDC operation.

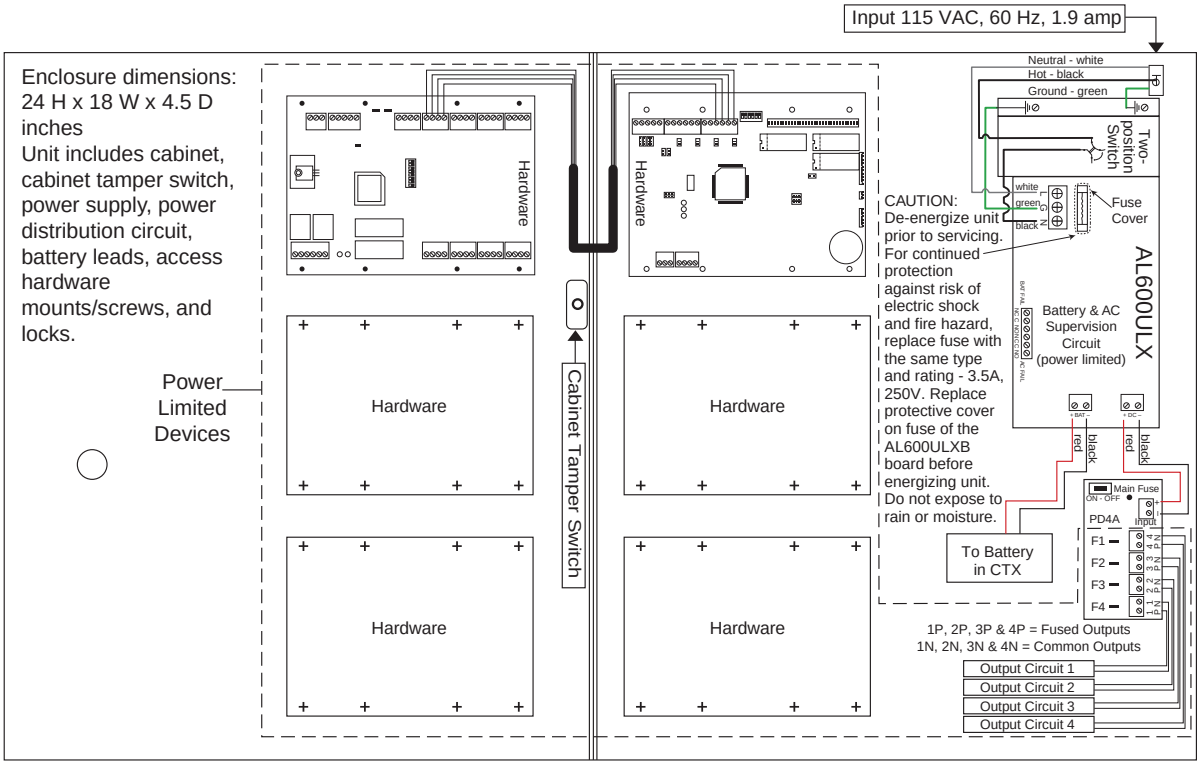
6. Connect appropriate trouble reporting devices to AC Fail and Low Battery supervisory relay outputs marked NC, C, NO. Use 22 AWG to 18 AWG for AC Fail and Low Battery reporting. AC Failure will report in five minutes. For a six-hour delay on reporting, cut resistor R1.

7. Wire routing note: UL two panel installation instructions for LNL-CTX enclosures
   To install multiple Lenel hardware panels into a single enclosure, the following guidelines must be used for certified UL installations.
   - All wire connections that cross over the hinge side of the door must be wire wrapped or tie wrapped together.
   - All wire must be routed behind the hardware panel so that the wires are secure from movement when opening and closing the door.
   - All connections for the lock side of the enclosure must come from behind the Lenel hardware devices.

2.2.2 LNL-AL600ULX-4CB6 Installation

The LNL-AL600ULX-4CB6 should be installed in accordance with article 760 of the National Electrical Code of NFPA72 as we as all applicable local codes. If you are located in Canada, refer to the Canadian Electrical Code.

1. Mount the enclosure in desired location.
2. The power supply is pre-wired to the ground (chassis). Connect main incoming ground to the provided green grounding conductor lead. Connect unswitched AC circuit (115 VAC/60 Hz) dedicated to the Burglar Alarm/Access Control Subsystem to terminals marked L, G, N.


Input 115 VAC, 60 Hz, 1.9 amp
Enclosure dimensions:
24 H x 18 W x 4.5 D inches
Unit includes cabinet, cabinet tamper switch, power supply, power distribution circuit, battery leads, access hardware mounts/screws, and locks.
Power Limited Devices
Hardware
Cabinet Tamper Switch
Neutral - white
Hot - black
Ground - green
Two-position Switch
white
green
black
Fuse Cover
AL600ULX
Battery & AC Supervision Circuit (power limited)
CAUTION: De-energize unit prior to servicing. For continued protection against risk of electric shock and fire hazard, replace fuse with the same type and rating - 3.5A, 250V. Replace protective cover on fuse of the AL600ULXB board before energizing unit. Do not expose to rain or moisture.
red
black
Main Fuse
ON - OFF
PD4A
F1
F2
F3
F4
To Battery in CTX
1P, 2P, 3P & 4P = Fused Outputs
1N, 2N, 3N & 4N = Common Outputs
Output Circuit 1
Output Circuit 2
Output Circuit 3
Output Circuit 4

3. Keep power limited wiring separate from non-power limited wiring (115 VAC/60 Hz Input, Battery wires). Minimum 0.25 inch spacing must be provided between power wires.
4. Connect devices to be powered to terminals marked (1P-1N, 2P-2N, 3P-3N, 4P-4N) and distribute evenly.

Note: It is important to measure output voltage before connecting devices. This helps avoid potential damage. Use 18 AWG or larger wire for all power connections (battery, DC outputs).

For UL Access Control applications, batteries are required. When batteries are not used, a loss of AC will result in the loss of output voltage. When the use of stand-by batteries is desired, they must be lead acid or gel type. Connect battery to terminals marked + BAT – (battery leads included). Use two 12 VDC batteries connected in series for 24 VDC operation.

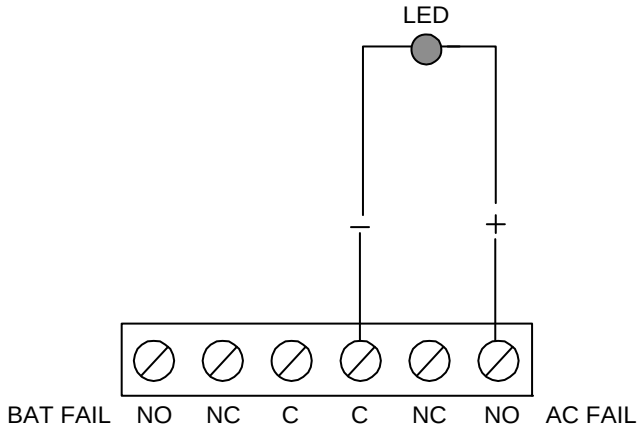
5. Connect appropriate trouble reporting device to the Battery Fail and AC Fail supervisory relay outputs marked NC, C, NO. Use 22 AWG or 18 AWG for AC Fail/Battery Fail reporting. AC Failure will report within 5 minutes. For a six-hour delay on reporting, cut resistor RL1.
6. Connect cabinet tamper switch to cabinet tamper circuit on the Lenel access hardware.
7. Wire routing note: UL six panel installation instructions for LNL-CTX enclosures
   To install multiple Lenel hardware panels into a single enclosure, the following guidelines must be used for certified UL installations.
   - All wire connections that cross over the hinged side of the door must be wire wrapped or tie wrapped together.
   - All wire must be routed behind the hardware panels so that the wires are secured from movement when opening and closing the door.
   - All connections from the lock side of the enclosure must come from the Lenel hardware devices.

2.2.3 AC Indicator

UL294 installations require an external AC indicator.

1. Locate the “AC FAIL” terminals.
2. Wire an LED indicator according to the following diagram.

AC indicator wiring



3. Install the indicator on the outside of the enclosure. It should be installed using the designated AC knockout.

2.2.4 Cabinet Tamper

Cabinet tamper for all enclosures must be connected and programmed for UL installations.

2.3 Ground Wiring

Each hardware product must be grounded to provide ESD protection, personnel safety, and signal reference for devices which communicate with each other. Grounding provides a good shield against external transients. See the installation manuals for the grounding point of each product.

There are three types of circuit grounds in systems using hardware products:

- DC negative
- RS-485 signal ground
- Safety ground

2.3.1 DC Negative

The DC ground provides signal reference for devices to communicate. It is the DC return from the power supply.

2.3.2 RS-485 Signal Ground (SG)

The RS-485 signal ground is connected to the DC ground internal to a device through a current limiting resistor. It provides a signal reference for the RS-485 interface.

2.3.3 Grounding System

A grounding system can be viewed as two subsystems: the DC system and the ground system. The DC system consists of all interconnected power supply returns, DC distribution wiring, and load devices. The principal function of the DC system is to provide signal reference for communication. The ground system consists of all chassis grounds for power supplies and other devices, safety grounds, and AC grounds. Ground connection should be made to avoid ground loop problems.

Ideally, there should be ONLY ONE ground return point in a power supply system.

2.3.4 Safety Ground

Safety ground (copper wire of 16 AWG minimum) is part of the AC power system. To avoid ground loop current, there must be NOT more than one point at which the safety ground connects to the DC ground.

The RS-485 signal ground must be isolated from the safety ground. This means that the RS-485 cable shield must be insulated so that it will NOT accidentally short circuit to the conduit in instances where the conduit is connected to the safety ground.

The National Electrical Code and other safety regulations require that all equipment chassis and or enclosures be grounded in order to prevent shock hazards. Each device must have a green wire safety ground. The function of the green wire safety ground is to provide a redundant path for fault currents and to insure that the circuit breaker will open in the event of a fault. In addition, grounding the enclosure provides a path for ESD dissipation, thus protecting sensitive electronic devices.

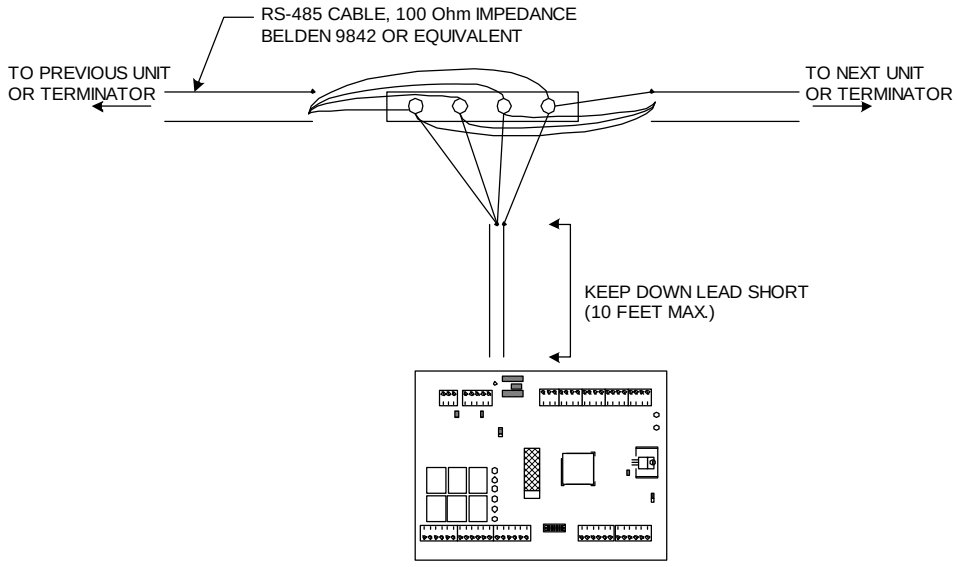
2.4 Alarm Input Wiring

All alarm inputs require twisted pair wires. An end-of-line (EOL) resistor terminator is required for each supervised alarm input. Both supervised and unsupervised alarm inputs can support single or multiple contacts per loop. Connect normally closed (NC) contacts in series and normally open (NO) contacts in parallel.

2.5 RS-485 Communication Wiring

Proper wiring for RS-485 communication interfaces is critical for successful system turn-up and operation. The following guidelines apply for all RS-485 wiring.

1. Use low capacitance shielded cable with 2 twisted pairs, characteristic impedance 120 ohms (Belden 9842 or equivalent) for the main RS-485 run.
2. Keep the main run maximum end-to-end distance below 4000 feet.
3. Use daisy chain configuration, NOT star configuration, to connect devices.
4. Use shielded 24 AWG cable with 2 twisted pair (Belden 9502 or equivalent.) for down leads (drops or stubs).
5. Keep down leads as short as possible (no longer than 10 feet).



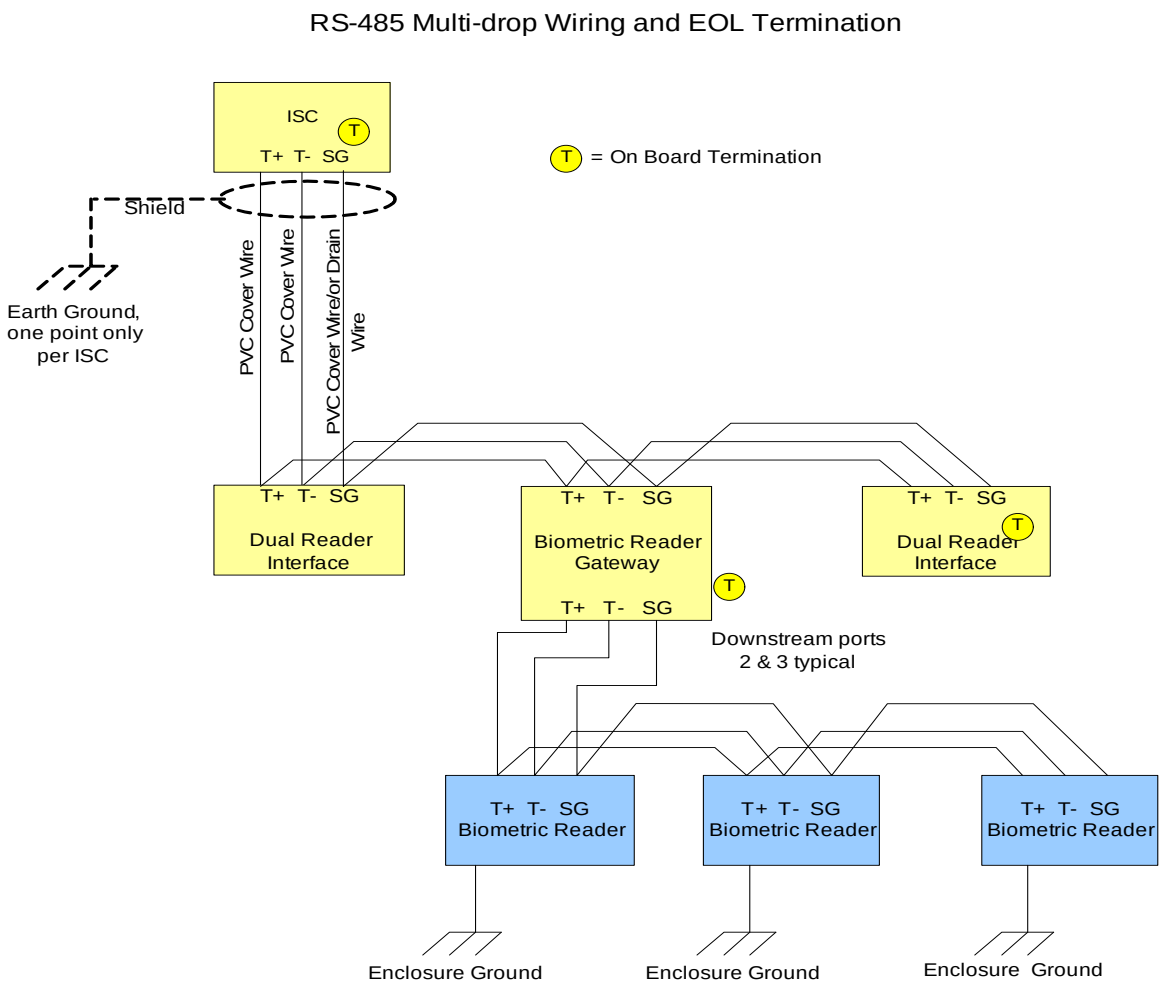
6. Terminate cables at both ends with RS-485 terminators (hardware has on-board terminators for RS-485 termination).
7. Always use the signal ground (SG) connection. Carefully insulate the SG wire for a reliable installation. Use 24 GA plastic sleeving over the SG wire when terminating the cable to the 5-position insulation displacement mating connector.

Each RS-485 communication line can have any number of DEPENDENT devices, but must have only one MASTER device. The transmit lines of the MASTER device are connected to the receive lines of the

DEPENDENT devices and the receive lines of the MASTER device are connected to the transmit lines of the DEPENDENT devices. Observe the + and the - of each pair (NOTE: only applies to 4-wire RS-485 wiring).

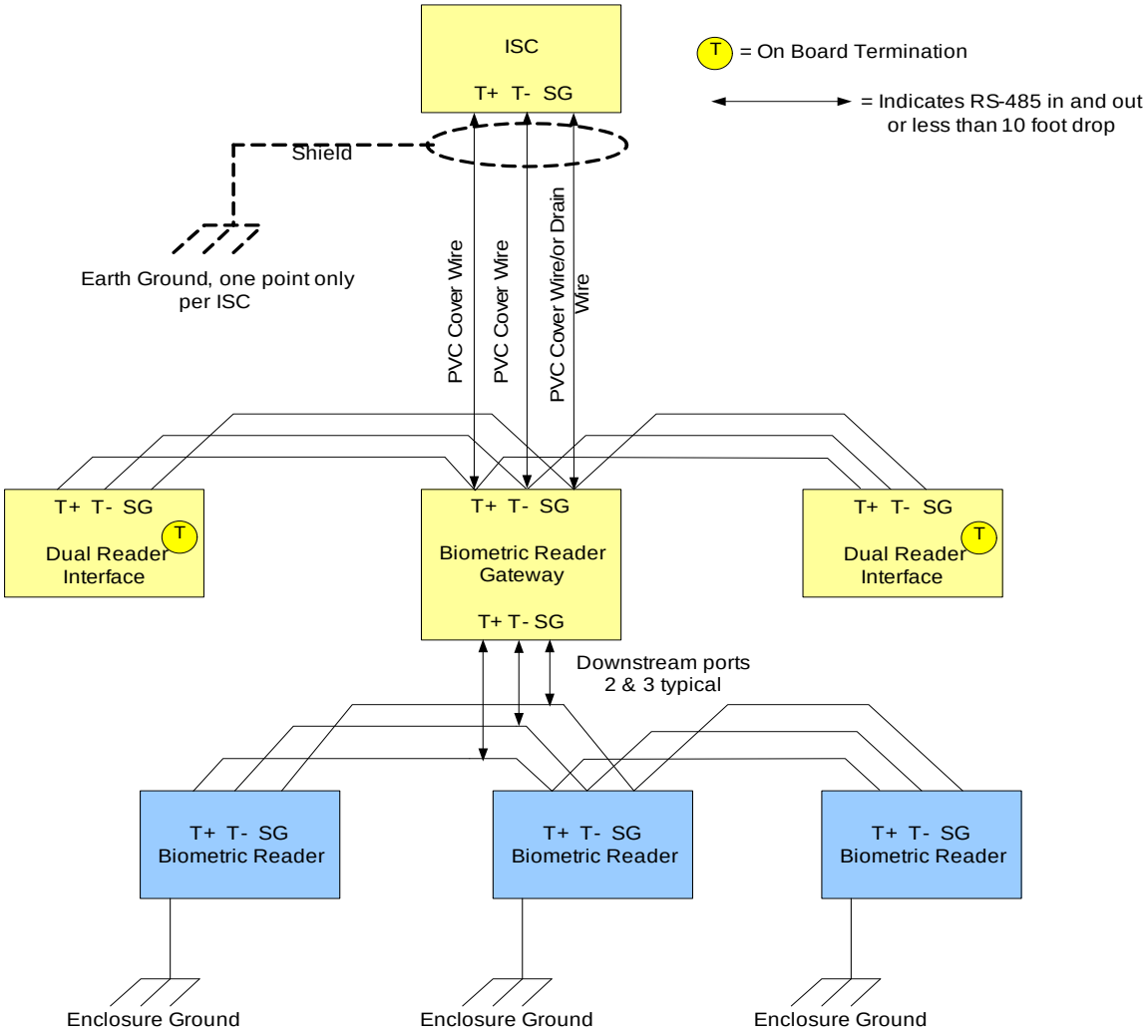
Refer to the following diagrams for RS-485 Signal Ground and Termination.

RS-485 Multi-drop Wiring and EOL Termination

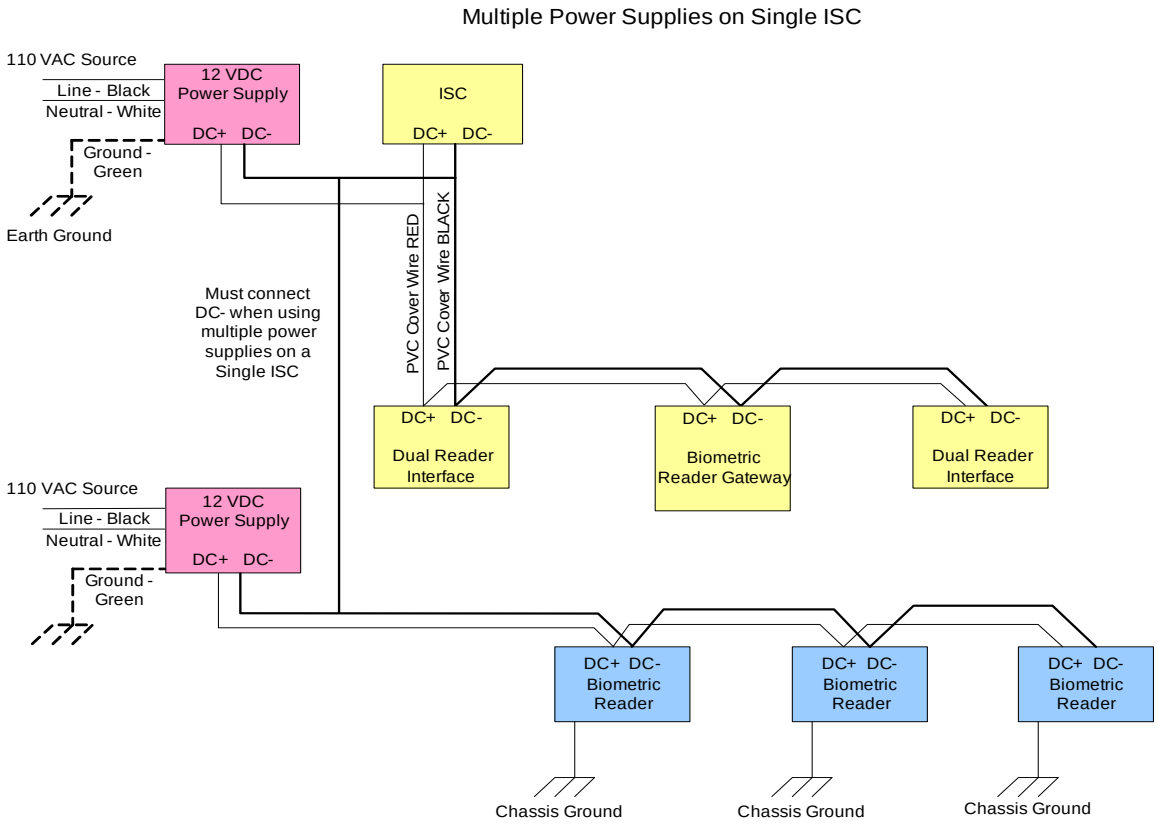


RS-485 Multi-drop Wiring and EOL Termination: ISC and LNL-500B

RS-485 Multi-drop Wiring and EOL Termination
ISC and Biometric Gateway Mid RS-485



Multiple Power Supplies on a Single ISC



2.6 RS-232 Communication Wiring

Observe the distance limitation or use suitable cable if the distance is greater than 50 feet. Remember to strap the control lines (RTS, CTS, etc.) if required.

2.7 Weatherproofing

The circuit board compartment of small readers should be sealed to protect from harsh environment.

Be sure to clean the read head(s).

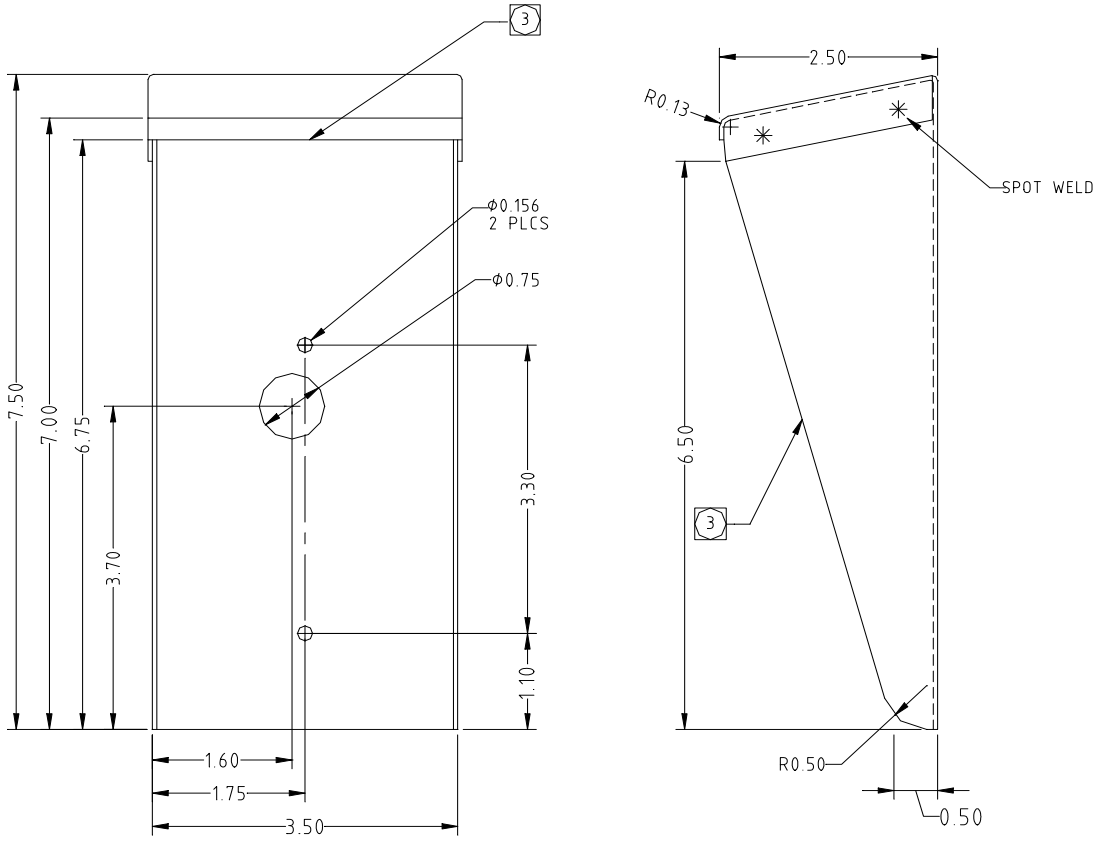
The leading cause of accelerated readhead wear is contamination in the read head slot. To maximize the life of the read head, it is important to clean the reader periodically to remove any contamination. The frequency depends on the environment in which the reader is located. Indoor readers in controlled environments will need to be cleaned much less often than an outdoor reader exposed to airborne dirt and debris. Dirt and debris are also transferred from cardholder cards that have been contaminated with sticky substances. Read head cleaning cards are available to clean the readers.

For heavy traffic areas, extended life read heads are also available from the factory at the time of order which will extend the read head life up to 1 million card swipes. For heavy traffic, outdoor readers should be cleaned at least once per month. A good indication as to how often a reader needs to be cleaned is when using a cleaning card, if the card has no visible signs of contamination, the reader could be serviced less

often. Another indication is if the card reader, starts to give invalid card reads, the reader may need to be serviced more often. A read head that is starting to fail due to exceeding the maximum number could cause this or card reads on the read head (std. 600,000 or extended 1million).

- **Weather Shield Option** even though the Magnetic swipe card readers are fully weatherized, there are still times when the card reader may need more protection from the environment. If a reader has been installed at a remote parking lot or on a build with no overhang to prevent rain, ice or snow from building up in the reader throat, you may want to install the weather shield (LNL-WS10). This weather shield can be used with all LNL-2005W, 2010W, and 2020W readers.

Weather Shield – part #LNL-WS10



3 EXPOSED EDGES (FRONT AND TOP) MUST BE ROUNDED/SMOOTHED, RADIUS 0.015 TYP.

2. FINISH: CLEAN AND DEBUR. SAND TO BREAK ALL EDGES.
   BRUSH FINISH TOP/SIDE SURFACES (200 GRIT). GRAIN VERTICAL.

1. MATERIAL: STAINLESS STEEL, TYPE 304-2B, 18GA

NOTES: UNLESS OTHERWISE SPECIFIED

2.8 Relay Contact Protection

The relays used by OnGuard hardware products have a contact life in excess of 500,000 operations at full rating. Lighter loads, and appropriate contact protection, extend relay life.

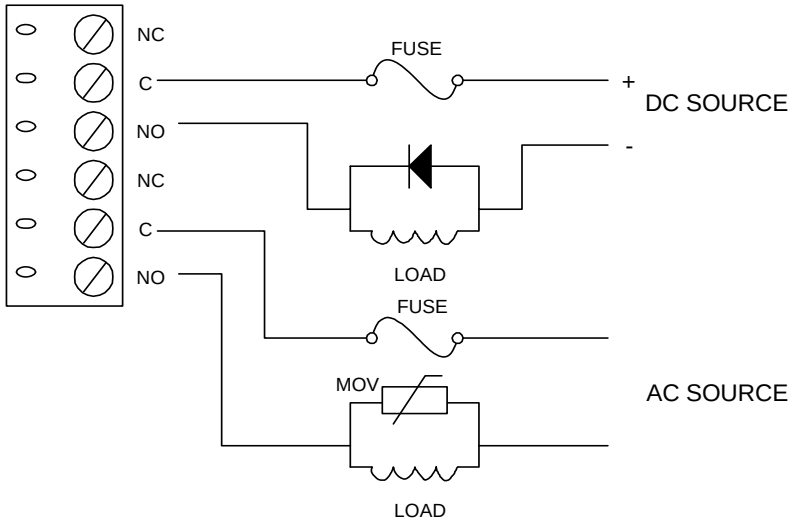
2.8.1 DC Inductive Load

Contacts for DC inductive loads can be effectively protected using clamp diodes. Select diodes with reverse breakdown voltage 10 times the circuit voltage.

2.8.2 AC Inductive Loads

Contacts for AC inductive loads can be protected using metal-oxide varistors (MOVs.) MOVs are effective when the load voltage is 100V to 200V. (MOVs are also suitable for DC operation.)

MOVs must be installed as close to the load as possible (within a few inches) to be effective. Mounted in this fashion, MOVs can also reduce the effects of EMI on sensitive electronic circuits.



3 System Turn-Up Considerations

A system should never be wired up and powered up all at once. For successful system turn-up, the following step-by-step procedures should be performed.

1. Make sure that no power is applied to any system device.
2. Check all wiring and device switch settings.
3. Disconnect all devices from the RS-485 communication line.
4. Power up the controller. (Check voltage requirement first.)
5. Configure the controller, and verify that it is working properly.
6. Connect one port of the RS-485 communication line to the multiplexer.
7. Power up a DEPENDENT device, and verify that it passes its own power-up self-test. (Check voltage requirement first.)
8. Check for ground fault between the DEPENDENT device and the RS-485 communication line. If applicable, find the fault and clear it.
9. Connect the DEPENDENT device to the RS-485 line and bring in on-line.
10. Verify all functions of the DEPENDENT device.
11. Verify the RS-485 line voltage in reference to the signal ground (SG.)
12. For each additional DEPENDENT device, repeat steps 7 through 11.
13. Verify the RS-485 line voltage for the controller, and mark the readings on the inside of the controller panel for future reference.

System Testing

For UL1076 compliance, a general system test should be performed at least once per year.

3.1 Device Configuration Checks

Common device configuration problems include mismatched baud rates and incorrect device addresses. No two devices on the same RS-485 line should have the same device address. Check all switch settings before attempting to bring the device on-line.

System programming must include the order of priority signals described below:

1. Hold-up or panic alarm or duress.
2. Burglar alarm.
3. Burglar-alarm supervision.
4. Industrial supervision where a risk of injury to persons, or damage or destruction of property will not be involved.
5. Other supervisory services.

Items (1) and (2) may have equal priority. Items (4) and (5) may have equal priority.

3.2 Ground Potential Difference Checks Before Connecting

Before a device can be connected to the RS-485 communication line, it must be checked for ground fault. Uncorrected ground fault can damage all devices connected to the RS-485 communication line.

To check if there is ground fault for a new unit, follow the steps below.

1. Apply power to all devices already successfully connected to the RS-485 line.
2. Power up the new unit, but DO NOT connect it to the RS-485 line.
3. Connect the signal ground (SG) of the RS-485 line through a 10K limiting resistor.
4. Measure the AC and DC voltage across the resistor. There should NOT be more than 1 volt across the resistor. Otherwise find and clear the fault.
5. Connect the new unit to the RS-485 line if no ground fault is found.

4 Maintenance

Firmware download is only supported for models and versions of Lenel hardware.

Firmware Download Capabilities (for *current* version of OnGuard)

Module	Is firmware download supported?	Requirements
Controller (LNL-500, 1000, 2000)	Yes	Firmware version 3.1xx or later is recommended
Controller (LNL-3300, 2220, 2210)	Yes	Firmware version is 1.1xx or later
Input Control Module (LNL-1100) Series 2	Yes	Firmware version is 1.3xx or later
Output Control Module (LNL-1200) Series 2	Yes	Firmware version is 1.3xx or later
Single Reader Interface Module (LNL-1300) Series 2	No	Currently, firmware version 1.3xx or later.
Dual Reader Interface Module (LNL-1320) Series 2	Yes	Firmware version is 1.3xx or later, and the board is rev. B
Command Keypad (LNL-CK)	Yes	Firmware version 1.50
Gateways (LNL-500B, 500W)	Yes	These have other firmware requirements, depending on their downstream devices. • For Bioscrypt V-Series readers, the LNL-500B requires firmware version 1.26. • For HandKey readers, the LNL-500B requires firmware version 1.25. • To use wireless readers, the LNL-500W requires firmware version 1.10

The most current version of the firmware is shipped with your OnGuard software and was installed during the initial software installation. Each subsequent software release you receive will also include the most current version of the firmware.

4.1 Firmware Updates

Do the following to update the firmware on your system. You must have the “ADMIN” permission level.

1. Install the new version of the OnGuard software.

2. In the Main Alarm Monitor window of the Alarm Monitoring module, right-click on the name of an access panel.
3. Select the **Download Firmware** choice from the popup menu
4. OnGuard will initiate the firmware update then perform a full download to the access panel and to all devices connected to it.

You must update each access panel in the system. Although it is not necessary to shutdown the application to perform the updates, note that the selected access panel is placed in a degraded off-line mode during the process. During this process, the readers connected to the panel are put into their off-line mode (“facility code only,” “locked,” etc.), which is configured on the Reader form of the System Administration module. It is strongly recommended that you perform the update on the panel during a time when no one will be accessing it.

Firmware can be simultaneously downloaded to multiple panels at once. However, it is recommended to do so one at a time to prevent any problems from occurring until you become familiar with the impact on system performance.

4.2 AES/Extended Firmware

The ISC (LNL-500, 1000, and 2000) supports encryption and asset management with use of AES/Extended firmware. The controller must have a 256 KB chip.

If you wish to use this feature and have a controller with a 128 KB chip, it must be upgraded. Typically, this upgrade would be required for the LNL-500 serial number 6352 or lower or the LNL-1000 serial number 12862 or lower.

Encryption is controlled by a DIP switch setting. Turn DIP switch 8 ON to enhance security. When a host system attempts to communicate with an encryption-enabled controller, a proper master key is required.

Note: The controller only reads DIP switch settings when it is powered up. If DIP switch settings are changed, the controller must go through a power cycle before the changes are seen.

Asset management can be done with any standard Wiegand output asset reader. Assets are stored in the controller and linked to cardholders.

5 UL Certified Installations

The system is to be installed within a protected premise. In a subassembly, the operating temperature range must be 0° to 49°C.

This system must be installed in accordance with the National Electrical Code (NFPA 70), and the local authority having jurisdiction. If you are located in Canada, please refer to the Canadian Electrical Code.

For UL Installations, the central supervisory station equipment must be UL Listed to the following standards:

1. Standard for Office Appliances & Business Equipment, UL 114
2. Standard for Information-Processing & Business Equipment, UL 478
3. Standard for Information Technology Equipment, UL 1950

For **UL Installations,** use UL Listed information technology equipment. The computer minimum platform requirements are as follows.

- Intel Pentium 4 dual core processor
- 3.4 GHz clock speed
- 1 GB RAM
- 6 GB of hard drive space
- DVD-ROM drive
- One (1) USB port
- Operating systems:
  - Windows Server 2008 R2
  - Windows 7
- Microsoft SQL Server 2008 (32 and 64-bit) or SQL 2008 Express
- Access control/proprietary burglary systems:
  - OnGuard 2008 (6.0.148) using Hardware Installation Guide revision 1.027
  - OnGuard 2008 Plus (6.1.222) using Hardware Installation Guide revision 1.035
  - OnGuard 2009 (6.3.249) using Hardware Installation Guide revision 1.048
- Controller firmware version 1.032 for the LNL-2220 or LNL-3300

The following devices must be incorporated into the system:

- Supply line transient protection complying with the Standard for Transient Voltage Surge Suppressors, UL 1449, with a maximum marked rating of 330 V.
- Signal line transient protection complying with the Standard for Protectors for Data Communications & Fire Alarm Circuits, UL 497B, with a maximum marked rating of 50 V.

Equipment must be installed in a temperature controlled environment, maintained between 13 - 35°C (55 - 95°F) by the HVAC system. 24 hours of standby must be provided for the HVAC system.

HVAC rated modules were not evaluated by UL for Lenel OnGuard UL1076 product Listing.

In addition to the main power supply and secondary power supply that are required to be provided at the central supervisory station, the system must be provided with an uninterruptable power supply (UPS) with

sufficient capacity to operate the computer equipment for a minimum of 15 minutes. If more than 15 minutes is required for the secondary power supply to supply the UPS input power, the UPS must be capable of providing input power for at least that amount of time. A means for disconnecting the input to the UPS while maintaining continuity of power to the automation system must be provided, in order to perform maintenance and repair service.

The UPS must comply with the Standard for Uninterruptable Power Supply Equipment, UL 1778, or the Standard for Fire Protective Signaling Devices, UL 1481.

Be sure to use the recommended cabling, which is the shielded wiring required for use on all modules.

Communication circuits and network components connected to the telecommunications network shall be protected by secondary protectors for communication circuits. These protectors shall comply with the Standard for Secondary Protectors or Communications Circuits, UL 497A. These protectors shall be used only in the protected side of the telecommunications network.

A metal conduit must be used when connecting all UL enclosures. This is required for all UL installations.

Do not exceed 1000 receiver accounts for UL.

All receiving equipment shall be completely duplicated with provision for switchover to the backup system within 30 seconds. The backup system shall be fully operational within 6 minutes of the loss of the primary system. (This allows 30 seconds for the backup system to be fully energized and connected to the necessary communication lines and other devices, followed by 5-1/2 minutes for the system to boot up, conduct memory tests, file system check, security verifications, and prepare for full system operation). The backup computer must have the capabilities of the primary, such as memory, speed, and the like.

Failure of the main computer system, hard disk, and alarm monitor must be programmed to switchover to the backup system, and indicate an audible, or obvious visual indication.

A fault tolerant system may be used in lieu of complete duplication of the system if every component in the fault tolerant system, including the software and power supply, is duplicated.

All OnGuard system solutions that are to be UL1076 compliant systems must also meet the requirements specified in Section 25A of the UL1076 (Proprietary Burglar Alarm Units and Systems Standard for Safety). This requirement outlines the need for host monitoring redundancy. Host monitoring redundancy can be accomplished in many ways, but the standard is clear as to receiving equipment methods, recovery time, surge suppression and system configurations. Contact Lenel if configuration assistance is required.

All inputs must be supervised for UL1076 installations.

Priority features (alarm, loss of line voltage, opens, shorts, etc.) must be programmed for an audio and a visual indication at the central supervisory station equipment, and to create a printout. The condition must be recorded. This indication shall not be silenced without acknowledgement.

Bypass of protective features, such as auto-bypass for forced arm, must not be programmed for UL.

If a modem or Ethernet is used as a method of communication, the connection must be maintained continuously.

Use Marking — Commercial, Proprietary, Multiplex, Encrypted Line Security Burglar Alarm System Control Unit and Access Control Unit.

Lenel AES Firmware v1.02 is “extended” firmware that is embedded (installed) in conjunction with Intelligent System Controllers (ISC), models LNL-500, LNL-1000, LNL-2000 (firmware version 3.085 or later), models LNL-2220, LNL-3300 (firmware version 1.032 to 1.068) for suitability as “Encrypted Line Security Equipment.”

5.1 Power

The standby power system for the HVAC system may be supplied by an engine driven generator alone. Use of a standby battery is not required.

All external interconnecting power sources must be UL Listed access control/proprietary burglary power limited power supplies. 110 V lines may not be routed in the same conduit or harness as low voltage lines.

5.1.1 UL Certified Power Supplies

For the UL certification, the power supply that must be used is the LNL-AL400ULX or LNL-AL600ULX-4CB6 with additional hardware mounted in LNL-CTX or LNL-CTX-6 enclosures. Other power supplies will be certified for use at a future date.

	Output	**4 hr. of Stand-by & 5 minutes of Alarm**	**24 hr. of Stand-by & 5 Minutes of Alarm**	**60 hr. of Stand-by & 5 Minutes of Alarm**
LNL-AL400ULX	12 VDC / 40 AH Battery	Stand-by = 4.0 amps Alarm = 4.0 amps	Stand-by = 1.0 amp Alarm = 4.0 amps	Stand-by = 300mA Alarm = 4.0 amps
	24 VDC / 12 AH Battery		Stand-by = 200 mA Alarm = 3.0 amps	
	24 VDC / 40 AH Battery	Stand-by = 3.0 amps Alarm = 3.0 amps	Stand-by = 1.0 amp Alarm = 3.0 amps	Stand-by = 300 mA Alarm = 3.0 amps
LNL-AL600ULX-4CB6	12 VDC / 40 AH Battery	Stand-by = 6.0 amps Alarm = 6.0 amps	Stand-by = 1.0 amp Alarm = 6.0 amps	Stand-by = 300 mA Alarm = 6.0 amps
	24 VDC / 12 AH Battery		Stand-by = 200 mA Alarm = 6.0 amps	
	24 VDC / 40 AH Battery	Stand-by = 6.0 amps Alarm = 6.0 amps	Stand-by = 1.0 amp Alarm = 6.0 amps	Stand-by = 300 mA Alarm = 6.0 amps

5.2 Typical Combinations for UL Installations

The following combinations must be used in a UL type installation with OnGuard software versions 6.0.xxx, 6.1.xxx, 6.3.xxx, which are approved for use. For UL certification, a UL Listed power supply, either LNL-AL400ULX or LNL-AL600ULX-4CB6 with additional hardware mounted in LNL-CTX or LNL-CTX-6 enclosures, must be used.

Multiple combinations of Lenel access hardware can be used within the UL approved power supply and enclosure.

Intelligent System Controller Combinations

Any individual board would be supported (LNL-500, LNL-1000, LNL-2000, LNL-3300, LNL-2210, LNL-2220) as well as any combination of the following boards within a single enclosure.

1. LNL-500, 1000, 2000, 3300, 2210 or 2220 Intelligent System Controllers
   LNL-1001-MK or LNL-1003-MK or LNL-1007MK (2000 only) Memory Expansion Modules
   LNL-1100 Alarm Input Control Module
2. LNL-500, 1000, 2000, 3300, 2210 or 2220 Intelligent System Controllers
   LNL-1001-MK or LNL-1003-MK or LNL-1007MK (2000 only) Memory Expansion Modules
   LNL-1200 Alarm Output Control Module
3. LNL-500, 1000, 2000, 3300, 2210 or 2220 Intelligent System Controllers
   LNL-1001-MK or LNL-1003-MK or LNL-1007MK (2000 only) Memory Expansion Modules
   LNL-1300 Single Reader Interface Module (Up to four (4) units)
4. LNL-500, 1000, 2000, 3300, 2210 or 2220 Intelligent System Controllers
   LNL-1001-MK or LNL-1003-MK or LNL-1007MK (2000 only) Memory Expansion Modules
   LNL-1320 Dual Reader Interface Module
5. LNL-500, 1000, 2000, 3300, 2210 or 2220 Intelligent System Controllers
   LNL-1001-MK or LNL-1003-MK or LNL-1007MK (2000 only) Memory Expansion Modules
   LNL-8000 Star Multiplexer
6. LNL-500, 1000, 2000, 3300, 2210 or 2220 Intelligent System Controllers
   LNL-1001-MK or LNL-1003-MK or LNL-1007MK (2000 only) Memory Expansion Modules
   LNL-4000 Multiplexer (Up to two (2) units)
7. LNL-500, 1000, 2000, 3300, 2210 or 2220 Intelligent System Controllers
   LNL-1001-MK or LNL-1003-MK or LNL-1007MK (2000 only) Memory Expansion Modules
   LNL-500A Asset Reader Interface Gateway
8. LNL-500, 1000, 2000, 3300, 2210 or 2220 Intelligent System Controllers
   LNL-1001-MK or LNL-1003-MK or LNL-1007MK (2000 only) Memory Expansion Modules
   LNL-500B or BI Biometric Reader Interface Gateway
9. HID Edge or HID Edge Plus Controller

Reader Interface Modules and Gateways Combinations

Any individual board would be supported (LNL-1300 or LNL-1320) as well as any combination of the following boards within a single LNL-CTX enclosure.

1. LNL-1320 Dual Reader Interface Module (up to two (2) units)
2. LNL-1300 Single Reader Interface Module (up to eight (8) units)
3. LNL-500B or BI Biometric Reader Interface Gateway (up to two (2) units)
4. LNL-2210 Intelligent Single Door Controller (up to two (2) Units)

Any individual board would be supported (LNL-1300 or LNL-1320) as well as any combination of the following boards within a single LNL-CTX-6 enclosure.

5. LNL-1320 Dual Reader Interface Module (up to six (6) units)
6. LNL-1300 Single Reader Interface Module (up to twenty-four (24) units)
7. LNL-500A Asset Reader Interface Gateway (up to six (6) units) (Legacy product, no longer available)

8. LNL-500B or BI Biometric Reader Interface Gateway (up to six (6) units)
9. LNL-2210 Intelligent Single Door Controller (up to six (6) units)

Input/Output Modules Combinations

Any individual board would be supported (LNL-1100 or LNL-1200) as well as any combination of the following boards within a single LNL-CTX enclosure.

1. LNL-1100 Alarm Input Control Module (up to two (2) units per enclosure)
2. LNL-1200 Alarm Output Control Module (up to two (2) units per enclosure)
3. LNL-1100 Alarm Input Control Module
   LNL-1200 Alarm Output Control Module
4. LNL-1100 Alarm Input Control Module
   LNL-1320 Dual Reader Interface Module
5. LNL-1200 Alarm Output Control Module
   LNL-1320 Dual Reader Interface Module

Any individual board would be supported (LNL-1100 or LNL-1200) as well as any combination of the following boards within a single LNL-CTX-6 enclosure.

6. LNL-1100 Alarm Input Control Module (up to six (6) units per enclosure)
7. LNL-1200 Alarm Output Control Module (up to six (6) units per enclosure)
8. LNL-1100 Alarm Input Control Module (up to three (3) units per enclosure)
   LNL-1200 Alarm Output Control Module (up to three (3) units per enclosure)
9. LNL-1100 Alarm Input Control Module (up to three (3) units per enclosure)
   LNL-1320 Dual Reader Interface Module (up to three (3) units per enclosure)
10. LNL-1200 Alarm Output Control Module (up to three (3) units per enclosure)
    LNL-1320 Dual Reader Interface Module (up to three (3) units per enclosure)

The LNL-2210 Intelligent Single Door Controller can by remotely powered by either the LNL-AL400ULX, LNL-AL600ULX-4CB6 or any other UL 294 approved power supplies. The LNL-2210 must be installed in accordance with the National Electrical Code in a triple gang electrical box. For UL installations, you must have a tamper switch connected from the electrical box cover to LNL-2210 tamper circuit.

UL Evaluated Readers and Card Formats

The following readers have been evaluated by UL for use with the OnGuard system.

- LNL-2005W Magnetic Card Access Reader - up to 128-bit format
- LNL-2010W Magnetic Card Access Reader - up to 128-bit format
- LNL-2020W Magnetic Card Access Reader - up to 128-bit format
- LPKP-6840 LenelProx with Keypad
- HID ProxPro 5355 - up to 128-bit format
- HID ThinLine II 5395 - up to 128-bit format
- HID 6125 (iCLASS RP40) - up to 128-bit format
- HID 6130 (iCLASS RK40) - up to 128-bit format

- HID 6136 (iCLASS RKP40) - up to 128-bit format
- HID 6145 (multiCLASS RP15) - up to 128-bit format
- HID Indala FP2513A (FlexPass) - up to 128-bit format
- HID 6170 (iCLASS RKL55) - up to 128-bit format (UL1076 - suitable for remote arming). This device is compatible with the LNL-2220/LNL-3300 controllers only.
- HID RWKL550 LCD Keypad Reader
- HID Edge devices 82000, 82120, 82125 (evaluated for access control applications only)
- Lenel OpenCard XF1050D, XF1500, XF2100D, XF2110D
- LNL-CK (UL1076 - suitable for remote arming). This device is compatible with the LNL-2220 or LNL-3300 controller only. External readers connected to the LNL-CK keypad have not been evaluated by UL.
- Magnetic, proximity, MIFARE, and iCLASS card formats
- Card formats from 26 to 200 bits
- UL evaluated readers and card formats for models LNL-1300-U and LNL-1320-U
- UTC Fire & Security Americas Corporation, Inc. (GE Security, Inc.), models T-500W, T-520W (for Wiegand only; up to 26 bits)
- Single Door Controller (SDC), model LNL-1300-U and Dual Door Controller (DDC), model LNL-1320-U have been evaluated for use with Intelligent System Controllers, models LNL-2220 and LNL-3300 only

5.2.1 Acknowledgement Signal

For remote arming (or switching the protection mode at the protected area), the system must be programmed to provide a visual and/or audible signal at the keypad to indicate to the attendant at the protected area that the confirmation closing signal has been received by the central supervising station.

5.3 UL Requirements

- The LNL-500 and LNL-1000 must be connected directly, through dial-up (a dedicated phone line must be used), or through Ethernet to the PC.
- The LNL-2000 must be connected through serial, dial-up, or Ethernet using a dedicated LAN. The secondary path must be connected through dial-up using a dedicated phone line or dedicated LAN for back up (dual signal line transmission).
- The LNL-2220 and LNL-3300 must be connected through serial, dial-up, or Ethernet using a dedicated LAN. The secondary path must be connected through dial-up using a dedicated phone line or dedicated LAN for back up (dual signal line transmission).
- When using dial-up connection, a dedicated phone line must be used. The modem connection must be maintained continuously.
- When using the Securecomm Uniflex DC336 modem, it must be in a secured box and powered by a UL Listed power supply.
- The relays on the LNL-1300 can only be used for access control applications.
- For the LNL-1300, field wiring for relay K2 should not extend beyond the room of installation.

The following devices/methods of communication have NOT been evaluated by UL for the UL1076 product Listing:

- CoBox Token Ring Serial Server
- HID Edge devices
- Lantronix CoBox-DR
- LNL-IC108A/IC109A
- KBC fiber optic modem
- LNL-838A converter
- Cypress Timer
- ILS locks

5.4 Troubleshooting

System Problem:	Possible Causes:
Software Connection Error in Alarm Monitoring	1. TCP/IP Connection Errors – TCP/IP must be configured on all workstations running Alarm Monitoring. Use a static IP address, not DHCP. 2. The Access Control Driver may not be running, or was started improperly. Close Alarm Monitoring and start driver. 3. Workstation running Alarm Monitoring is not in the monitoring zone for the access panel. 4. Workstation name is incorrect in software configuration for access panel.
Access granted causes a communications loss to the reader	Make sure that you have not exceeded the maximum current draw of your power supply.
Client workstation unable to connect with the access database	Use the standard naming convention for database location (instead of mapped drive) in your ODBC settings (e.g. \\Server\accessct.mdb). This eliminates the need for mapped drives. Make sure the drive where the database resides is shared.
Unstable communication with system hardware	Check end of line termination jumpers. Only the first and the last device on each RS-485 communication line should be terminated.
Intelligent System Controller	
Panel is offline	1. Port 1 communication wiring is incorrect. Use meter to check pin-outs, do not rely on coloring schemes. 2. Panel address does not match software configuration. 3. In software configuration, verify that the panel has been set “online.” 4. Also verify that the baud rate is set for 38400. 5. Check for software connection error and see above.
Dial-up communication errors	1. Panel address must be set to “1.” 2. Check communication wiring per diagram. 3. Use recommended modems only; check DIP switch settings on modem.
Lantronix communication errors	1. Clear Lantronix memory and follow setup procedures *exactly* as written. 2. Check wiring between the ISC and the Lantronix box. 3. Dip switch 5 must be set to the “on” position. 4. “Autobaud” setting must be disabled.

System Problem:	Possible Causes:
Entry denied on valid badges	Panel memory in the software configuration must match the physical memory on the board. If unsure of panel memory, use "display panel capacity" in the Alarm Monitoring options menu to verify proper configuration.
Reader Interface Modules, Readers	
Keypad is not responding, or "invalid badge" appears with each numeric entry	"Keypad type" in reader software configuration is incorrect. Refer to reader documentation for output format.
Reader is offline	"Reader type" in software configuration is incorrect. If using the dual interface module, be sure to specify RDR2 in the settings for RDR1. If interface module is incorrect (dual configured as a single), you will need to delete the reader entirely and add it again as a new reader. Restarting Alarm Monitoring may be necessary to view the reader online.
Reader settings have changed for no apparent reason	When using the "allow multiple selection" feature, *all* settings for the selected readers will be configured identically, *not* just the ones you modify. Use with caution.
"Invalid Card Format" alarm on magnetic cards encoded with application software	Check magnetic format setting in Badge Configuration. The sum of all field lengths should match the "total characters on track 2" setting. Verify field length setting for facility code correlates with what is being encoded on stripe.

LNL-500 INTELLIGENT SYSTEM CONTROLLER

6 Overview of the LNL-500

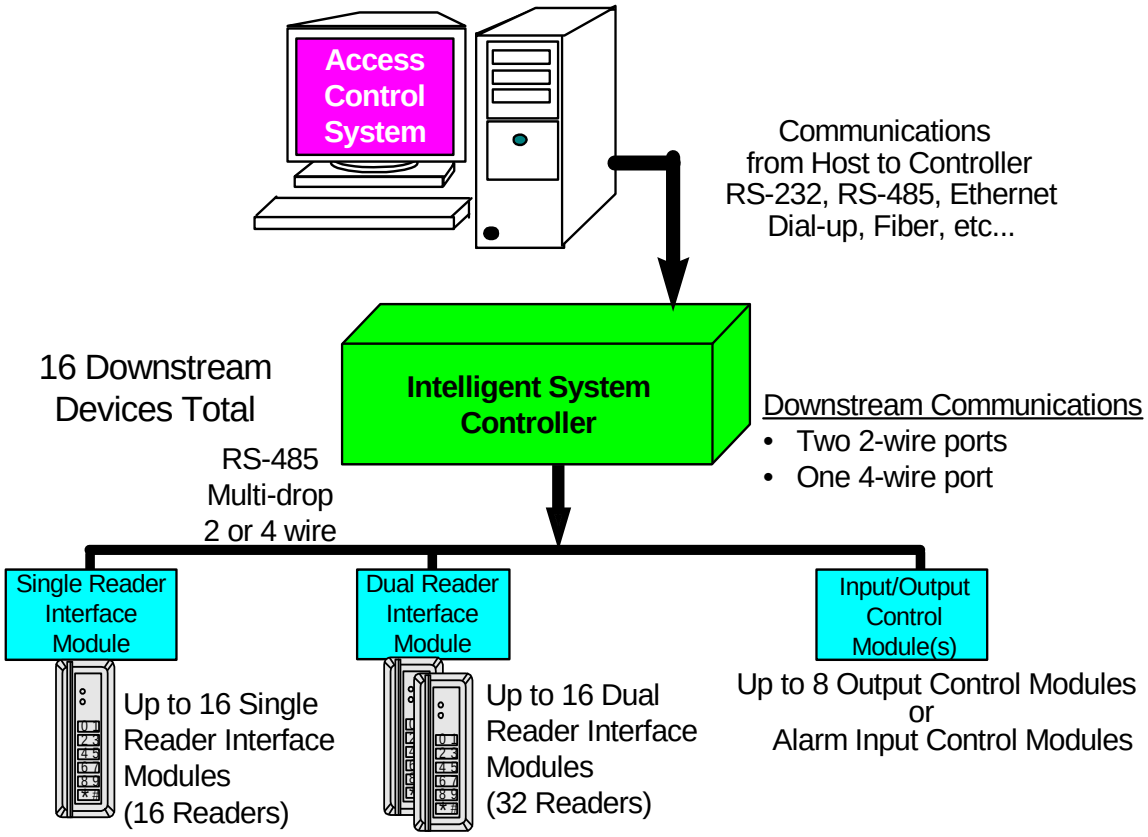
This installation guide is intended for use by technicians who will be installing and maintaining the Intelligent System Controller (LNL-500).

The ISC provides real time processing for the I/O interfaces to which it is connected. It holds the database for the subsystem configuration and cardholders, the event log buffer in battery-backed memory.

6.1 Interfaces

The ISC interfaces upstream with the Access Control software on a host system and downstream with the following field hardware components:

Intelligent System Controller Communications Overview

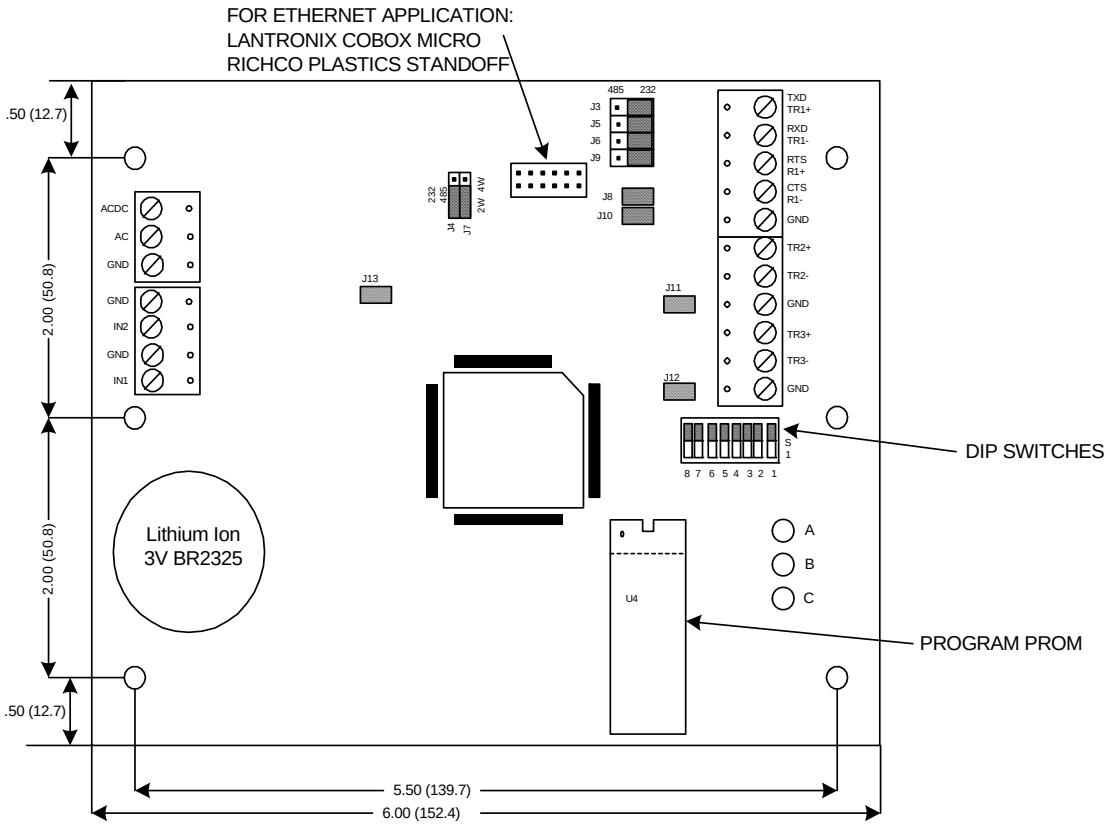

Access Control System
Communications from Host to Controller
RS-232, RS-485, Ethernet
Dial-up, Fiber, etc...
16 Downstream Devices Total
Intelligent System Controller
Downstream Communications
• Two 2-wire ports
• One 4-wire port
RS-485
Multi-drop
2 or 4 wire
Single Reader Interface Module
Dual Reader Interface Module
Input/Output Control Module(s)
Up to 16 Single Reader Interface Modules (16 Readers)
Up to 16 Dual Reader Interface Modules (32 Readers)
Up to 8 Output Control Modules or Alarm Input Control Modules

6.2 The Intelligent System Controller Board

The ISC board contains the following components: two (2) unsupervised alarm inputs, one (1) RS-232 or RS-485 interface, two (2) RS-485 interfaces (which can consist of two 2-wire or one 4-wire interfaces), one

(1) power-in input, eight (8) DIP switches, and eleven (11) jumpers. It also contains a set of three (3) status LEDs and one (1) memory backup (3 volt lithium) battery.

LNL-500 Board



Note: The Cobox connector is only present on LNL-500 boards rev. A, SN 002002 or higher.

7 Installation

To install the ISC, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
2. Wire the upstream host communication.
3. Wire the downstream device communication.
4. Wire the power input.
5. Remove the plastic safety strip from the memory backup battery.

7.1 Wiring

7.1.1 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

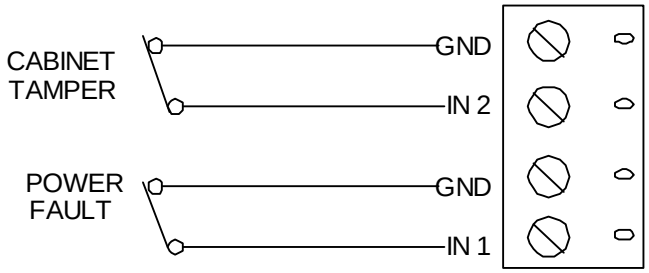
The ISC features two unsupervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the Input 2 (IN2) and Input 1 (IN1) contact terminals on the ISC board.

Input 2 and Input 1 are both simple N/C (normally closed) contact closure monitors.

Wire the Input 2 and Input 1 contacts using twisted pair cable, 30 ohms maximum. (No EOL resistors are required.)

Note: If either of these inputs is not used, a shorting wire should be installed.

Unsupervised Alarm Input Wiring



7.1.2 Upstream Host Communication

The ISC uses **Port 1** to communicate to the host system. Port 1 can be wired as an RS-232 interface for direct one-to-one (or modem) communication, or as an RS-485 interface for multi-drop or extended distance communication.

Direct-connect RS-232 cables should be no longer than 50 feet. Leased lines or fiber optics can also be used.

For RS-485 communication, the following type of RS-485 cable is required: 24 AWG (minimum) twisted pair (with shields). Either 2-wire or 4-wire RS-485 cable configuration can be used. The RS-485 cable should be no longer than 4000 feet (1219 m), 120 ohms maximum (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102, West Penn, or equivalent.) The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

RS-232 Communications

The RS-232 communications interface is for short distance wiring or point-to-point communications. A number of products provide RS-232 interfaces such as connections to local printer, modem, PC, etc. This interface is intended for a short distance communication because its high impedance is more susceptible to noise. Cable length is generally limited to 50 feet (15m). If required, this distance may be extended to a few hundred feet by using low capacitance shielded cables. The optimal cable is a Belden 9610 or equivalent wire.

RS-485 Communications

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distance (4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances end-of-line (EOL) termination is required.

RS-485 Line Termination

RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has an on-board terminator. It is up to the installer to determine which device is at the End of the communication line. (see diagram below)

Belden (24 gauge wire – (7x32) Stranded Conductors – Polyethylene Insulated)

Belden Wire Specifications

Trade Number UL NEC Type CSA Certification	Number of Pairs	Nominal D.C. R. Conductor	Shield	Nominal Impedance (Ohms)	Nominal Capacitance	
					pF/feet	pF/meter
9841 NEC CM CSA	1	24.0 ohms/M 78.7 ohms/ km	3.35 ohms/M 11.0 ohms/K	120	12.8	42
9842 NEC CM CSA	2	24.0 ohms/M 78.7 ohms/ km	2.2 ohms/M 7.2 ohms/K	120	12.8	42

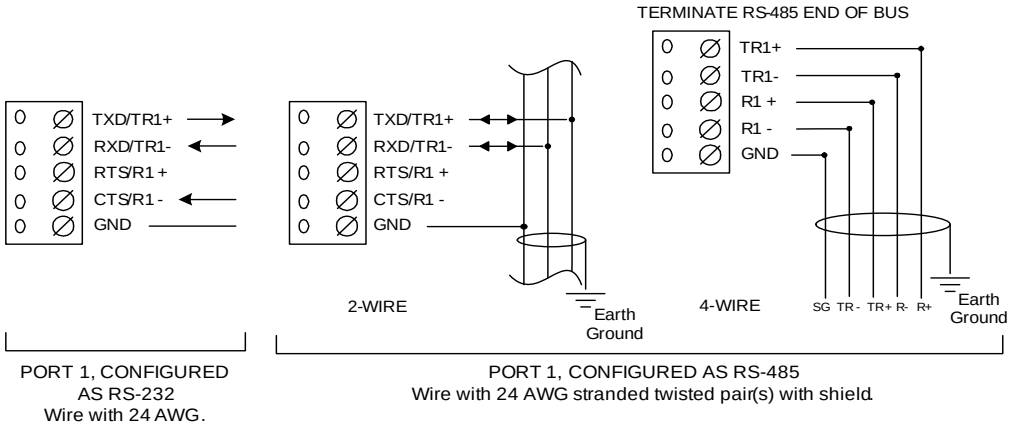
Belden Wire Specifications

Trade Number UL NEC Type CSA Certification	Number of Pairs	Nominal D.C. R. Conductor	Shield	Nominal Impedance (Ohms)	Nominal Capacitance	
					pF/feet	pF/meter
88102 NEC CMP CSA	2	24.0 ohms/M 78.7 ohms/ km	15.5 ohms/M 50.9 ohms/km	100	12.95	42

Notes: If RS-485 communication is used, an RS-232 to RS-485 converter is required at the host workstation.

The 2-wire configuration is recommended over the 4-wire for RS-485.

Upstream Host Communication Wiring (Port 1) for direct connect and Lantronix

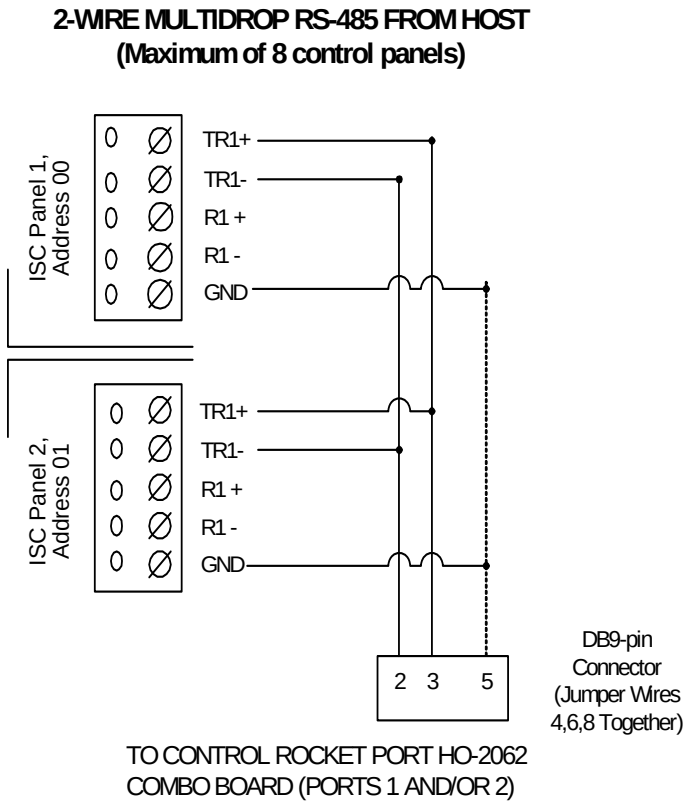


Port 1 – wiring configuration. This configuration will work for direct connect (RS-232) and Lantronix Ethernet network communications. With direct connect and with Lantronix, DIP switch 5 needs to be ON.

ISC	9-pin connector	25 – pin connector
TXD/TR1+	pin 2	pin 3
RXD/TR1-	pin 3	pin 2
RTS/R1+	not used	not used
CTS/R1-	pin 7	pin 4
GND	pin 5	pin 7
Jumper together	4, 6 & 8	5,6 & 20

Note: To connect the ISC to Rocket Port via 2-wire RS-485, the toggle RTS low checkbox should be checked in the Rocket Port settings.

2-Wire RS-485 from Host



Wire Configuration – Switch #5 must be off for all panels in this configuration.

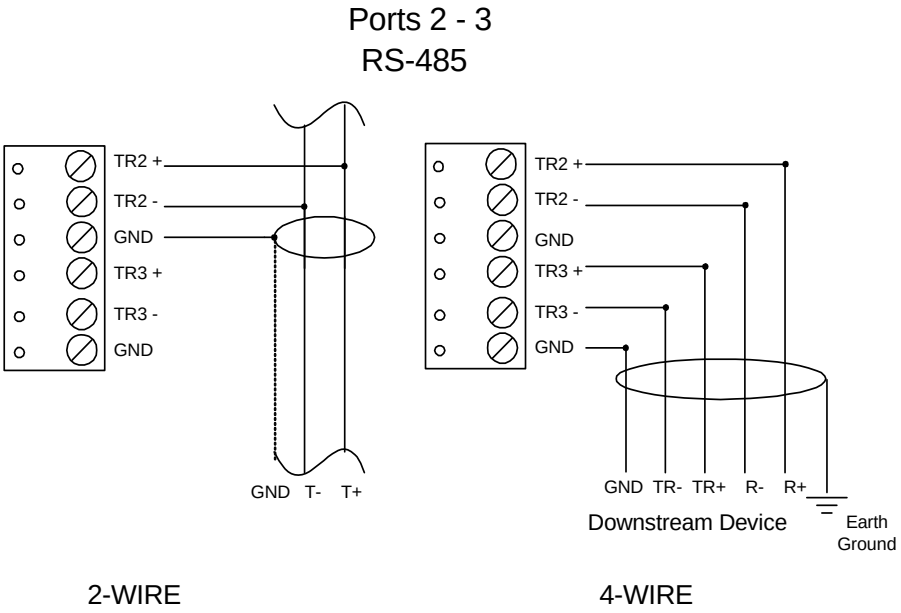
7.1.3 Downstream Device Communication

The ISC can be configured to communicate downstream with up to 8 input/output devices, using Port 2 and Port 3. Each of these ports can be wired only as an RS-485 interface, for multi-drop communication on a single bus of up to 4000 feet.

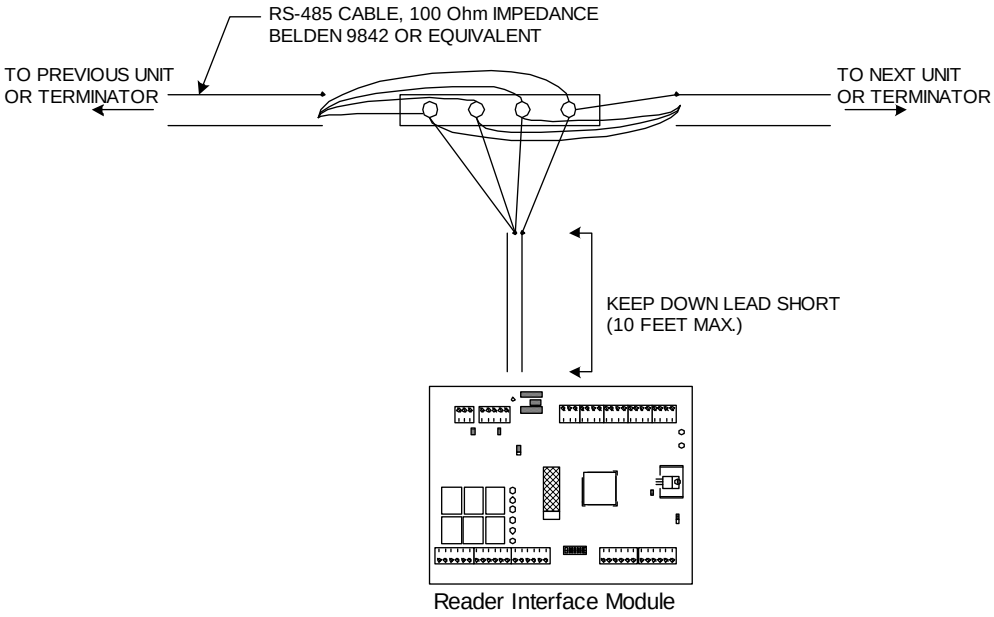
For Ports 2-3, the following type of RS-485 cable is required: 24 AWG (minimum) twisted pair (with shields.) Either 2-wire or 4-wire RS-485 cable configuration can be used. The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102, West Penn, or equivalent). The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

Each RS-485 line should contain only 2 terminators, one at each end.

Downstream Device Communication Wiring (Ports 2-3)



RS-485 Communication Wiring



To configure all four downstream ISC ports as 2-wire RS-485, follow the 2-wire diagram and repeat on each set of three terminators, TRX+, TRX-, GND.

To configure as two 4-wire RS-485 ports, follow the 4-wire diagram:

Port 2/3:	(Transmit) TR2+, TR2-	(Receive) TR3+, TR3-	GRD

Notes: The ISC can be located anywhere along the RS-485 line.

Install an RS-485 terminator for each end-of-line device.

7.1.4 Power

The ISC accepts either a 12 VDC or 12 VAC ± 15% power source for its power input. The power source should be located as close to the ISC as possible.

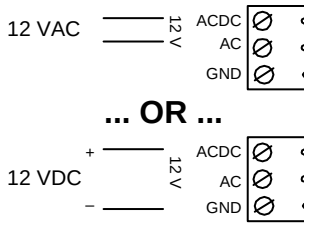
Wire the power input with 18 AWG (minimum) twisted pair cable.

For AC power sources, the following lines are required: AC Line (L), AC Neutral (N). These lines must not be interchanged. A 400 mA RMS current is required for AC power supplies.

For DC power sources, isolated and non-switching, regulated DC power is required. A 250 mA current is required for DC power supplies.

Note: If using a 12 VDC power source, be sure to observe polarity.

Power Source Wiring



7.1.5 Other

Remove the factory-installed plastic safety strip from the memory backup battery. This plastic strip prevents the battery from being effectively seated. The battery will not function properly until the plastic strip is removed. When the battery is enabled, all volatile RAM is protected.

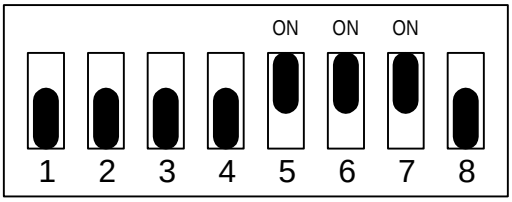
Note: You must first remove the plastic strip to enable the battery.

8 Configuration

The ISC board contains 8 DIP switches and 12 jumpers that must be configured appropriately for your system.

8.1 Setting DIP Switches

DIP Switches (illustrated: default address of 0, CTS enabled, baud rate = 38400)



The following chart describes the use of each DIP switch.

DIP SWITCH(ES)	USED TO CONFIGURE:
1, 2, 3, 4	Processor address (0 – 7)
5	Communication handshake status (“CTS enabled” or “none”)
6, 7	Communication baud rate (38400, 19200, 9600 bps)
8	Communication password status (“required”, “not required”)

8.1.1 Processor Address

To configure the processor address, set DIP switches 1, 2, 3, and 4 according to the following table.

Address	DIP SWITCH			
	1:	2:	3:	4:
0 (default)	off	off	off	off
1	ON	off	off	off
2	off	ON	off	off
3	ON	ON	off	off
4	off	off	ON	off
5	ON	off	ON	off
6	off	ON	ON	off
7	ON	ON	ON	off

8.1.2 Communication Handshake Status

To configure the communication handshake status, set DIP switch 5 according to the following table. Leave this feature set to ON for Lantronix, dial-up, and RS-232, and OFF for RS-485 communication.

HANDSHAKE STATUS	DIP SWITCH 5:
Transmit enabled by CTS (default)	ON
None	off

8.1.3 Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table. This feature controls the baud rate for upstream communication.

BAUD RATE	DIP SWITCH	
	6:	7:
38400 bps (default)	ON	ON
19200 bps	off	ON
9600 bps	ON	off
(not used)	off	off

8.1.4 Communication Password Status

DIP switch 8 controls the utilization of encryption.

The ISC supports encryption with use of AES firmware. The controller must have a 256 KB chip. If you wish to use this feature and have a controller with a 128 KB chip, it must be upgraded.

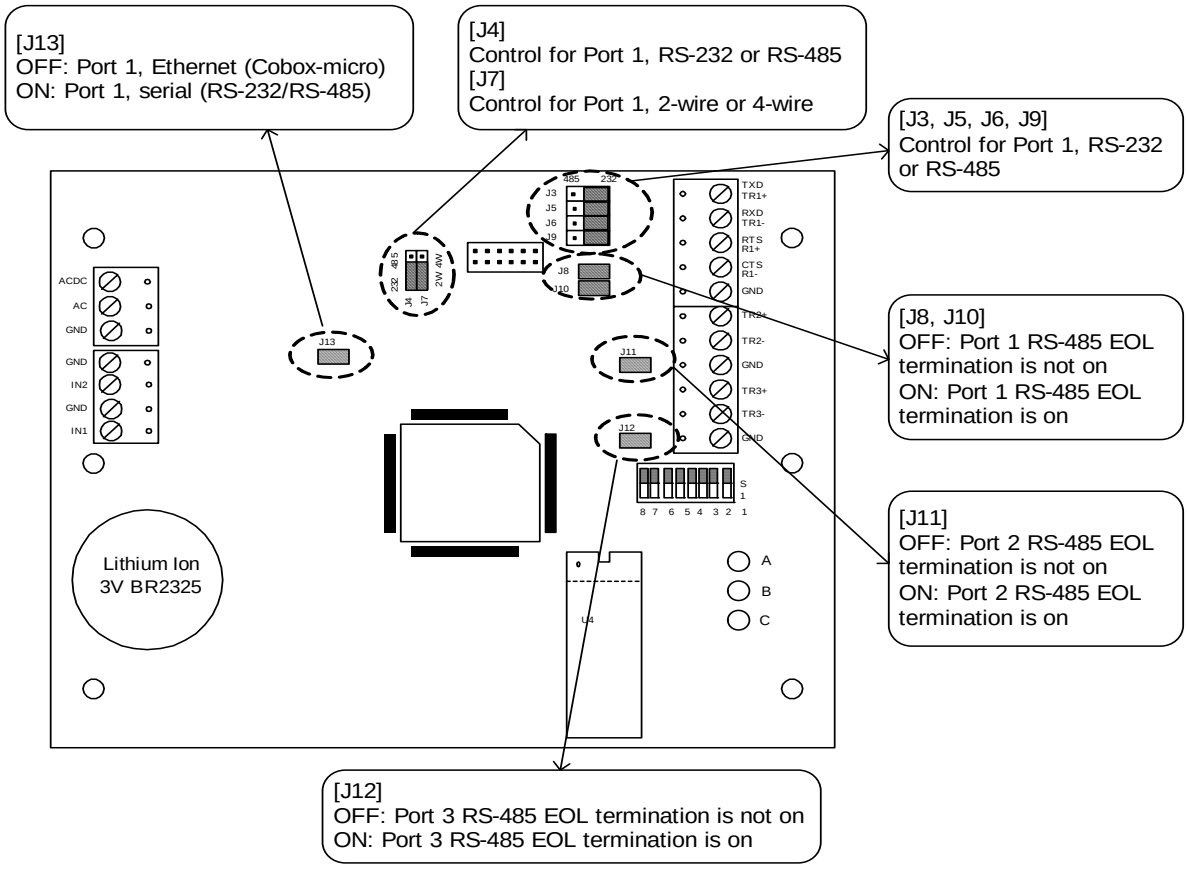
PASSWORD STATUS	DIP SWITCH 8:
Encryption is optional	off
Encryption is required	ON

Turn DIP switch 8 ON to enhance security. When a host system attempts to communicate with an encryption-enabled controller, a proper master key is required.

Note: The controller only reads DIP switch settings when it is powered up. If DIP switch settings are changed, the controller must go through a power cycle before the changes are seen.

8.2 Installing Jumpers

The following diagram describes the use of each jumper on the ISC board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.



8.2.1 RS-485 Cable Termination from Host to ISC

The device used to convert RS-232 communication to RS-485 determines the termination necessary for this segment of the RS-485 communication bus. These communications devices, pre-bias the RS-485 signal, which marks the state of the signal being sent and allows the line to flow for reliable communications. This is true for most devices that are used for Host to ISC communications, but any device that has been approved by Lenel will indicate how termination should be configured for proper operation in its documentation.

8.2.2 RS-485 Cable Termination from ISC to Downstream Modules

Termination of this section of the RS-485 bus always remains the same. Each end of the RS-485 bus must be terminated using the on-board jumpers provided with each piece of hardware. Please refer to the termination drawings for each component being installed in this hardware manual.

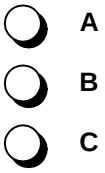
Note: This applies to Ports 2 and 3.

9 Maintenance

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

9.1 Verification

The ISC board contains three Status LEDs (LED A, LED B, LED C) that can be used to verify correct installation after power up.



The following chart describes the purpose of each LED on the ISC board.

LED	Purpose
A	This LED blinks rapidly whenever the ISC is powered up and is operating normally.
B	This LED is on when upstream communication to host computer is in process.
C	This LED is on when downstream communication to reader interfaces or input/ output modules is in process.

9.2 Replace Memory Backup Battery

The ISC contains a Memory Backup battery that is used to backup configuration data and event buffer data in the event of a power failure.

A 3 V lithium ion battery (Rayovac BR2325 or Wuhan Lixing CR2330) is used for the Memory Backup. This battery should be replaced annually.

Caution: There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with the manufacturer's instructions.

10 Specifications

The LNL-500 is for use in low voltage, class 2 circuits only.

- Primary Power: (DC or AC)
  - DC input: 12 VDC ± 10%. 250 mA
  - AC input: 12 VAC ± 15%. 400 mA RMS

- Memory and Clock Backup: 3 V lithium, type BR2325

- Communication Ports:
  - Port 1: RS-232 or RS-485, 9600 to 38400 bps async
  - Ports 2-3: RS-485 (2-wire), 9600 to 38400 bps async

- Inputs:
  - Cabinet Tamper Monitor: unsupervised, dedicated
  - Power Fault Monitor: unsupervised, dedicated

- Wire Requirements:
  - Power: 1 stranded twisted pair, 18 AWG
  - RS-485: 24 AWG stranded twisted pair(s) with shield, 4000 feet (1219 m) maximum
  - RS-232: 24 AWGstranded, 25 feet (7.6 m) maximum
  - Alarm Input: stranded twisted pair, 30 ohms maximum

- Environmental:
  - Temperature: Operating: 0° to +70° C (32° to 158° F)
  - Humidity: 0 to 95% RHNC

- Mechanical:
  - Dimension: 6 x 5 x 1 in. (152 x 127 x 25 mm)
  - Weight: 8 oz. (227 g) nominal

- Data Memory: 512 KB

- Certifications:
  - UL294 & UL1076 Listed
  - ULC Listed
  - FCC Part 15
  - C-Tick
  - FIPS 197 Certificate #305
  - CE marking
  - RoHS compliant
  - WEEE

Note: These specifications are subject to change without notice.

LNL-1000 INTELLIGENT SYSTEM CONTROLLER

11 Overview of the LNL-1000

This installation guide is intended for use by technicians who will be installing and maintaining the Intelligent System Controller.

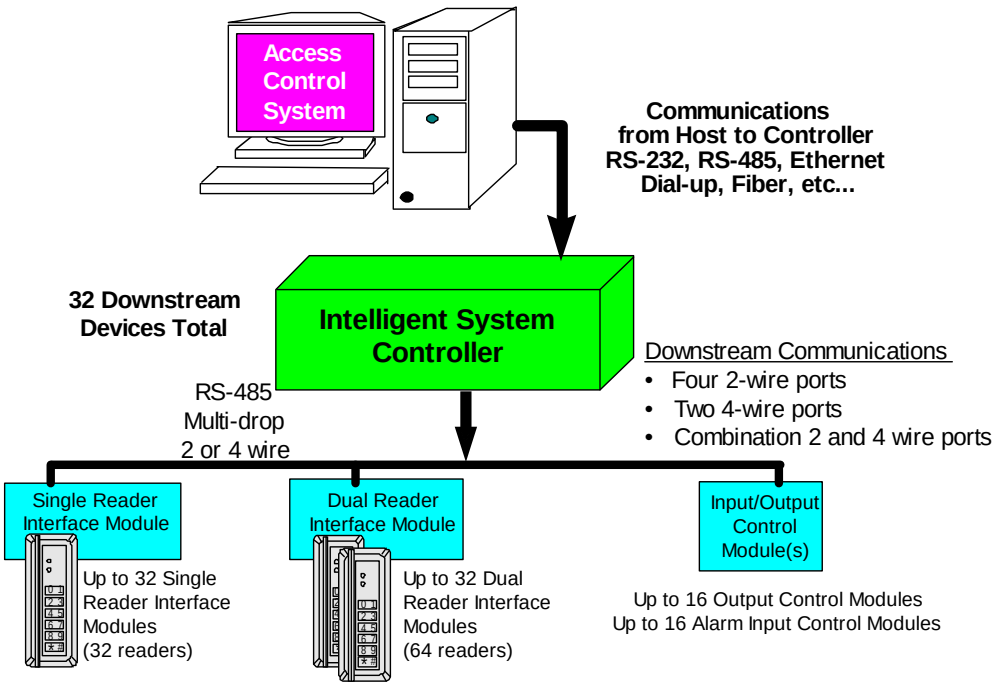
The Intelligent System Controller (ISC) serves as the predominant access control engine. The ISC provides power, performance, and flexibility for the most demanding applications. Multiple combinations of Alarm Input Control Modules, Output Control Modules, and card reader interface modules can be configured.

The ISC can communicate upstream at 38.4 Kbps via RS-232, RS-485 multi-dropped configurations, modem dial-up communications, Ethernet TCP/IP networks, or Token Ring networks. The standard ISC can store 5,000 cardholders and 100,000 events, with expansion capabilities for up to 250,000 cardholders and 1 million events. The ISC has four downstream 2-wire RS-485 channels or two 4-wire RS-485 channels. In either configuration you may connect up to 64 readers or 32 devices on a single Intelligent System Controller. Each SRI, DRI, ICM and OCM takes up one device address.

11.1 Interfaces

The ISC interfaces upstream with the Access Control software on a host system, and downstream with the following field hardware components:

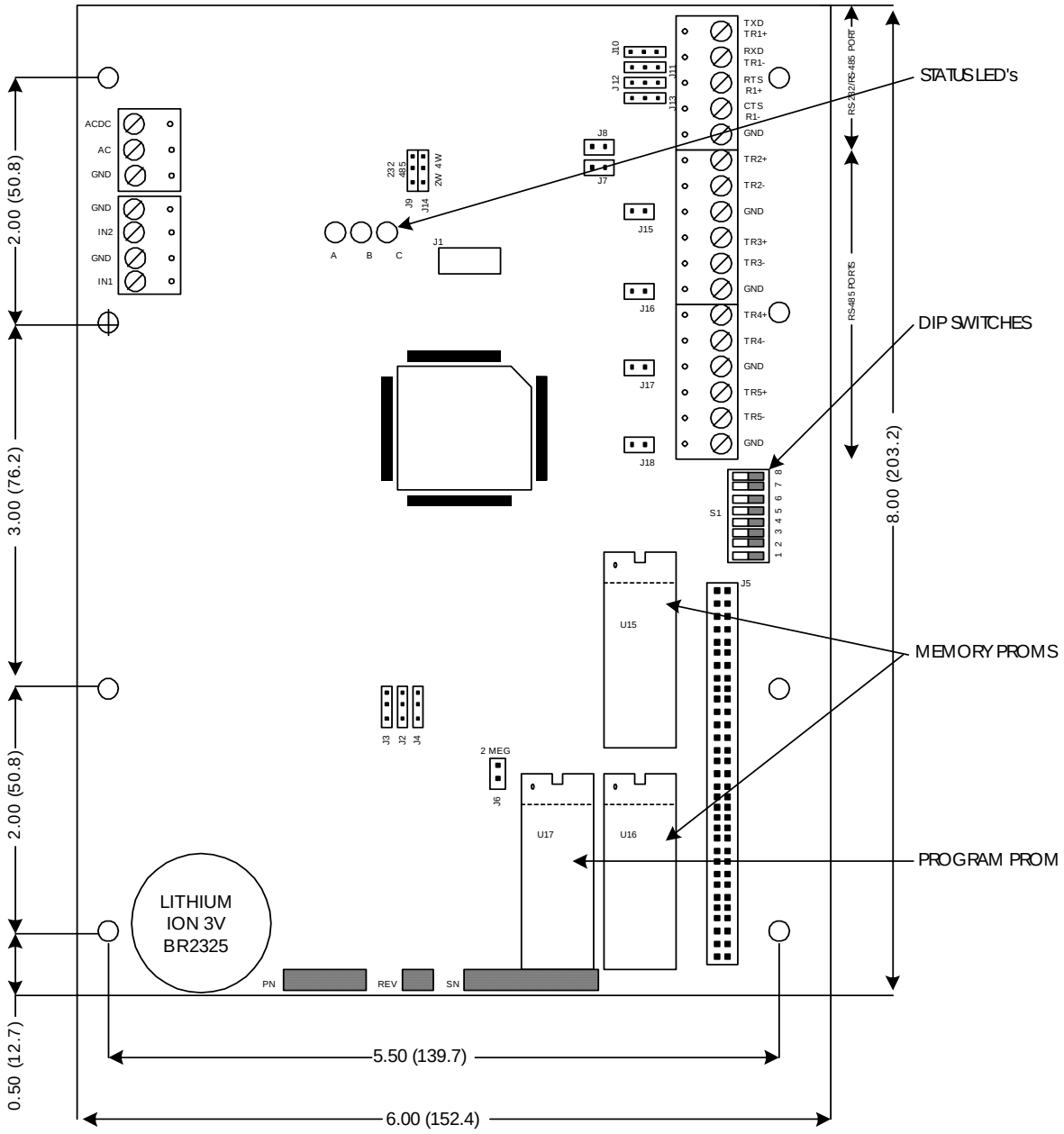
Intelligent System Controller Communications Overview


Access Control System
Communications from Host to Controller
RS-232, RS-485, Ethernet
Dial-up, Fiber, etc...
32 Downstream Devices Total
Intelligent System Controller
Downstream Communications
• Four 2-wire ports
• Two 4-wire ports
• Combination 2 and 4 wire ports
RS-485 Multi-drop 2 or 4 wire
Single Reader Interface Module
Dual Reader Interface Module
Input/Output Control Module(s)
Up to 32 Single Reader Interface Modules (32 readers)
Up to 32 Dual Reader Interface Modules (64 readers)
Up to 16 Output Control Modules
Up to 16 Alarm Input Control Modules

11.2 The ISC Board

The ISC board contains the following components: two (2) unsupervised alarm inputs, one (1) RS-232 or RS-485 interface, four (4) RS-485 interfaces (which can consist of four 2-wire, two 4-wire, or one 4-wire and two 2-wire interfaces), one (1) power-in input, eight (8) DIP switches, and sixteen (16) jumpers. It also contains a set of three (3) status LEDs and one (1) memory backup (3 volt lithium) battery.

The ISC Board



12 Installation

To install the ISC, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
2. Wire the upstream host communication.
3. Wire the downstream device communication.
4. Wire the power input.
5. Remove the plastic safety strip from the memory backup battery.

12.1 Wiring

12.1.1 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

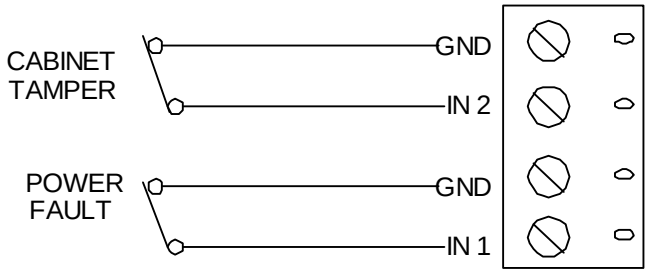
The ISC features two unsupervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the Input 2 (IN2) and Input 1 (IN1) contact terminals on the ISC board.

Input 2 and Input 1 are both simple N/C (normally closed) contact closure monitors.

Wire the Input 2 and Input 1 contacts using twisted pair cable, 30 ohms maximum. (No EOL resistors are required.)

Note: If either of these inputs is not used, a shorting wire should be installed.

Unsupervised Alarm Input Wiring.



12.1.2 Upstream Host Communication

The ISC uses Port 1 to communicate to the host system. Port 1 can be wired as an RS-232 interface for direct one-to-one (or modem) communication, or as an RS-485 interface for multi-drop or extended distance communication.

Direct-connect RS-232 cables should be no longer than 50 feet. Leased lines or fiber optics can also be used.

For RS-485 communication, the following type of RS-485 cable is required: 24 AWG (minimum) twisted pair (with shields.) Either 2-wire or 4-wire RS-485 cable configuration can be used. The RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102, West Penn, or equivalent.) The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

RS-232 Communications

The RS-232 communications interface is for short distance wiring or point to point communications. A number of products provide RS-232 interfaces such as connections to local printer, modem, PC, etc. This interface is intended for a short distance communication because its high impedance is more susceptible to noise. Cable length is generally limited to 50 feet (15m). If required, this distance may be extended to a few hundred feet by using low capacitance shielded cables. The optimal cable is a (Belden 9610) or equivalent wire.

RS-485 Communications

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multiport communications on a bus transmission line. It allows for high-speed data transfer over extended distance (4000 feet, 1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances End-of-line (EOL) termination is required.

RS-485 Line Termination

RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each has an on-board terminator. It is up to the installer to determine which device is at the End of the communication line (see diagram).

Belden (24 gauge wire – (7x32) Stranded Conductors – Polyethylene Insulated)

Belden Wire Specifications

Trade Number UL NEC Type CSA Certification	Number of Pairs	Nominal D.C. R. Conductor	Shield	Nominal Impedance (Ohms)	Nominal Capacitance	
					pF/feet	pF/ meter
9841 NEC CM CSA	1	24.0 ohms/M 78.7 ohms/ km	3.35 ohms/M 11.0 ohms/K	120	12.8	42
9842 NEC CM CSA	2	24.0 ohms/M 78.7 ohms/ km	2.2 ohms/M 7.2 ohms/K	120	12.8	42

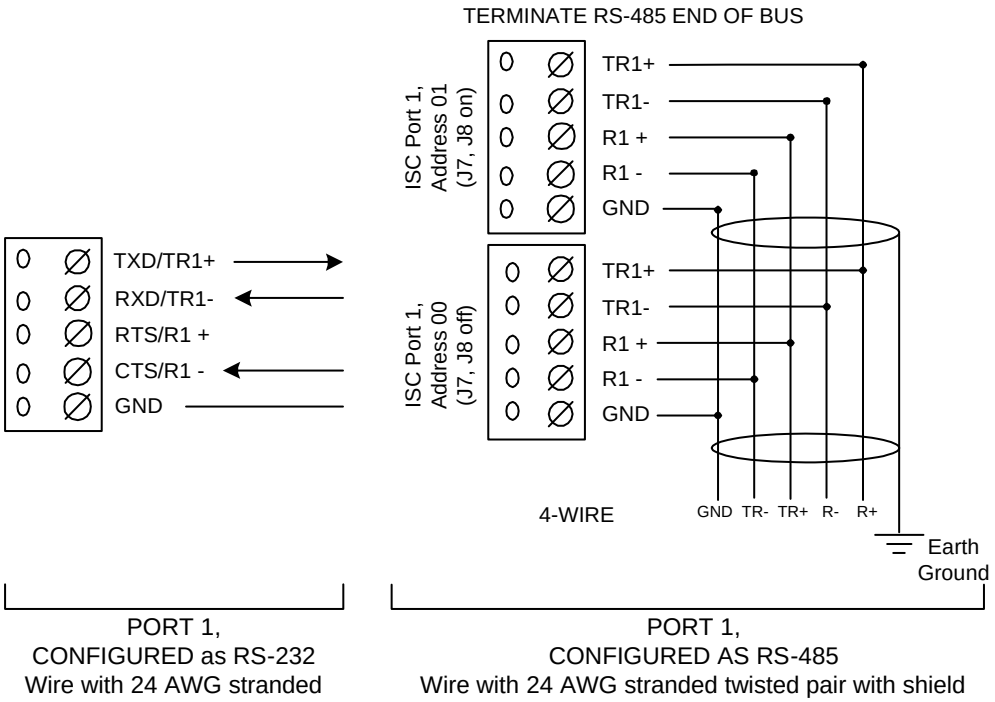
Belden Wire Specifications

Trade Number UL NEC Type CSA Certification	Number of Pairs	Nominal D.C. R. Conductor	Shield	Nominal Impedance (Ohms)	Nominal Capacitance	
					pF/feet	pF/ meter
88102 NEC CMP CSA	2	24.0 ohms/M 78.7 ohms/ km	15.5 ohms/M 50.9 ohms/km	100	12.95	42

Notes: If RS-485 communication is used, an RS-232 to RS-485 converter is required at the host workstation.

The 2-wire configuration is recommended over the 4-wire for RS-485.

Upstream Host Communication Wiring (Port 1)



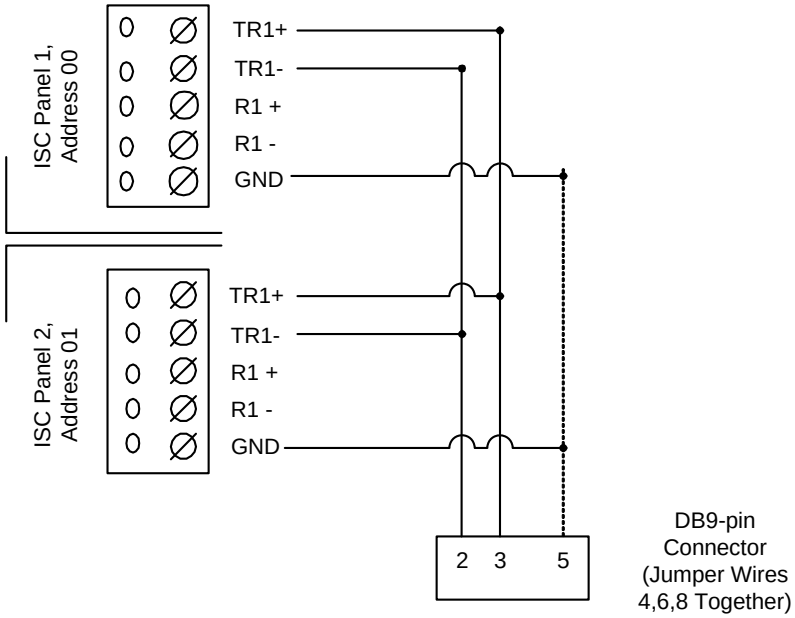
Port 1 – wiring configuration. This configuration will work for Direct connect (RS-232) and Lantronix Ethernet network communications. With direct connect and with Lantronix, DIP switch 5 needs to be ON.

ISC	9-pin connector	25 – pin connector
TXD/TR1+	pin 2	pin 3

ISC	9-pin connector	25 – pin connector
RXD/TR1-	pin 3	pin 2
RTS/R1+	not used	not used
CTS/R1-	pin 7	pin 4
GND	pin 5	pin 7
Jumper together	4, 6 & 8	5,6 & 20

Note: To connect the ISC to Rocket Port via 2-wire RS-485, the toggle RTS low checkbox should be checked in the Rocket Port settings.

2-WIRE MULTIDROP RS-485 FROM HOST
(Maximum of 8 control panels)



TO CONTROL ROCKET PORT HO-2062
COMBO BOARD (PORTS 1 AND/OR 2)

Wire Configuration – Switch #5 must be off for all panels in this configuration.

Panel 1		Panel 2	
Jumper	**Setting**	**Jumper**	**Setting**
J7, J8	Off	J7, J8	On
J9, J10, J11, J12, J13	RS-485	J9, J10, J11, J12, J13	RS-485
J14	2-wire	J14	2-wire

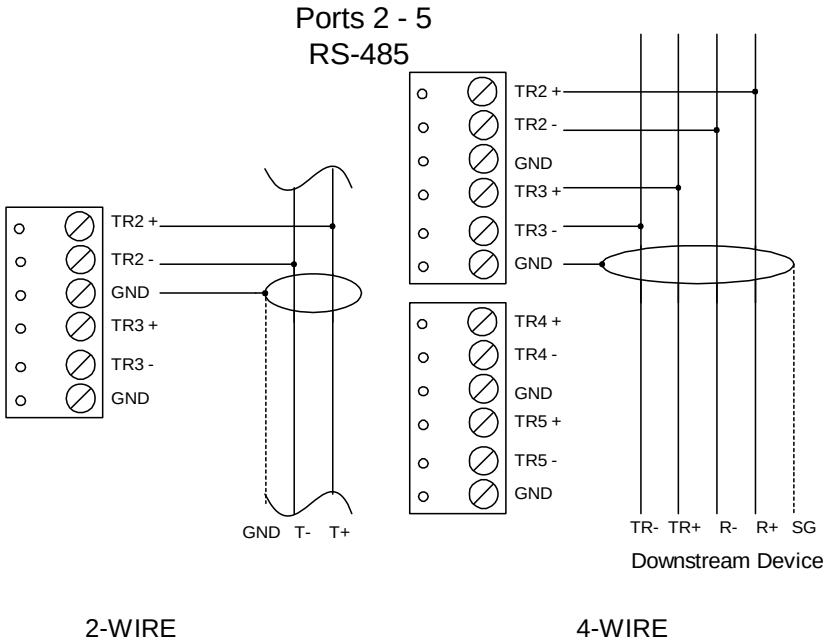
12.1.3 Downstream Device Communication

The ISC can be configured to communicate downstream with up to 16 input/output devices, using Port 2, Port 3, Port 4, and Port 5. Each of these ports can be wired only as an RS-485 interface, for multi-drop communication on a single bus of up to 4000 feet.

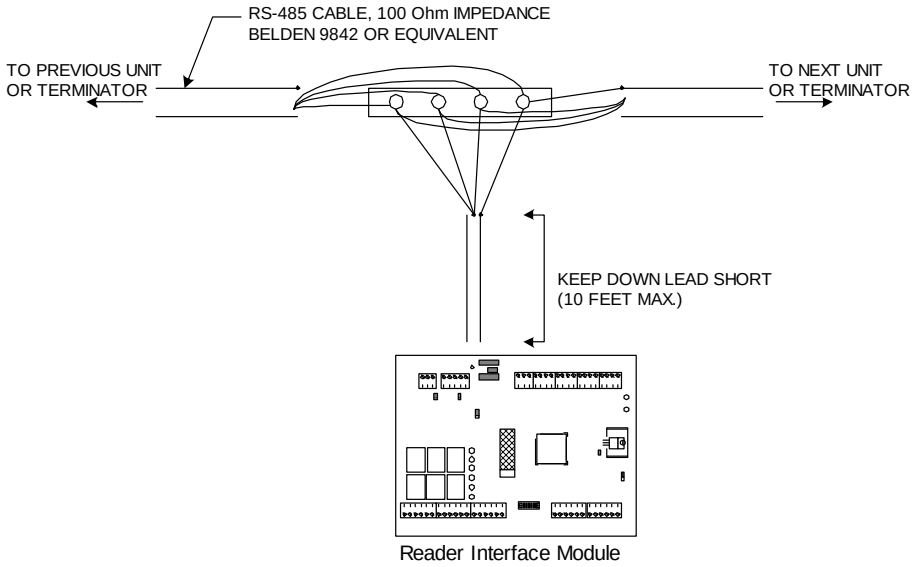
For Ports 2-5, the following type of RS-485 cable is required: 24 AWG (minimum) twisted pair (with shields.) Either 2-wire or 4-wire RS-485 cable configuration can be used. The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102 or equivalent). The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

Each RS-485 line should contain only 2 terminators, one at each end.

Downstream Device Communication Wiring (Ports 2-5)



RS-485 Communication Wiring



To configure all four downstream ISC ports as 2-wire RS-485, follow the 2-wire diagram and repeat on each set of three terminators, TRX+, TRX-, GND.

To configure as two 4-wire RS-485 ports, follow the 4-wire diagram:

Port 2/3:	(Transmit) TR2+, TR2-	(Receive) TR3+, TR3-	GRD
Port 4/5:	(Transmit) TR4+, TR4-	(Receive) TR5+, TR5-	GRD

or combine 2-wire and 4-wire RS-485:

Port 2/3: 4-wire	(Transmit) TR2+, TR2-	(Receive) TR3+, TR3-	GRD
Port 4: 2-wire	TR4+, TR4-		GRD
Port 5: 2-wire	TR5+, TR5-		GRD

Notes: The ISC can be located anywhere along the RS-485 line.

Install an RS-485 terminator for each end-of-line device.

12.1.4 Power

The ISC accepts either a 12 VDC or 12 VAC ± 15% power source for its power input. The power source should be located as close to the ISC as possible.

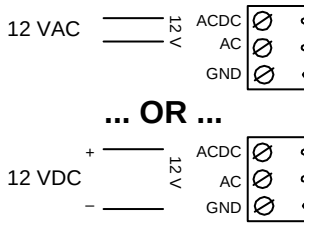
Wire the power input with 18 AWG (minimum) twisted pair cable.

For AC power sources, the following lines are required: AC Line (L), AC Neutral (N). These lines must not be interchanged. A 600mA RMS current is required for AC power supplies.

For DC power sources, isolated and non-switching, regulated DC power is required. A 350mA current is required for DC power supplies.

Note: If using a 12 VDC power source, be sure to observe polarity.

Power Source Wiring



12.1.5 Other

Remove the factory-installed plastic safety strip from the Memory Backup battery. This plastic strip prevents the battery from being effectively seated. The battery will not function properly until the plastic strip is removed. When the battery is enabled, all volatile RAM is protected.

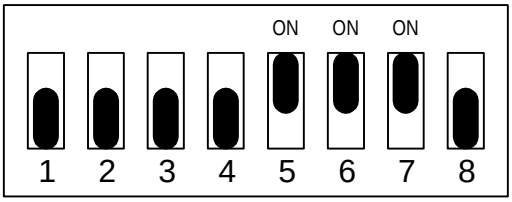
Note: You must first remove the plastic strip to enable the battery.

13 Configuration

The ISC board contains 8 DIP switches and 16 jumpers that must be configured appropriately for your system.

13.1 Setting DIP Switches

DIP Switches (illustrated: default address of 0, CTS enabled, baud rate = 38400)



The following chart describes the use of each DIP switch.

DIP SWITCH(ES)	USED TO CONFIGURE:
1, 2, 3, 4	Processor address (0 – 7)
5	Communication handshake status (“CTS enabled” or “none”)
6, 7	Communication baud rate (38400, 19200, 9600 bps)
8	Communication password status (“required”, “not required”)

13.1.1 Processor Address

To configure the processor address, set DIP switches 1, 2, 3, and 4 according to the following table.

Address	DIP SWITCH			
	1:	2:	3:	4:
0 (default)	off	off	off	off
1	ON	off	off	off
2	off	ON	off	off
3	ON	ON	off	off
4	off	off	ON	off
5	ON	off	ON	off
6	off	ON	ON	off
7	ON	ON	ON	off

13.1.2 Communication Handshake Status

To configure the communication handshake status, set DIP switch 5 according to the following table. Leave this feature set to ON for Lantronix, dial-up, and RS-232, and OFF for RS-485 communication.

HANDSHAKE STATUS	DIP SWITCH 5:
Transmit enabled by CTS (default)	ON
None	off

13.1.3 Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table. This feature controls the baud rate for upstream communication.

BAUD RATE	DIP SWITCH	
	6:	7:
38400 bps (default)	ON	ON
19200 bps	off	ON
9600 bps	ON	off
(not used)	off	off

13.1.4 Communication Password Status

DIP switch 8 controls the utilization of encryption.

The ISC supports encryption with use of AES firmware. The controller must have a 256 KB chip. If you wish to use this feature and have a controller with a 128 KB chip, it must be upgraded.

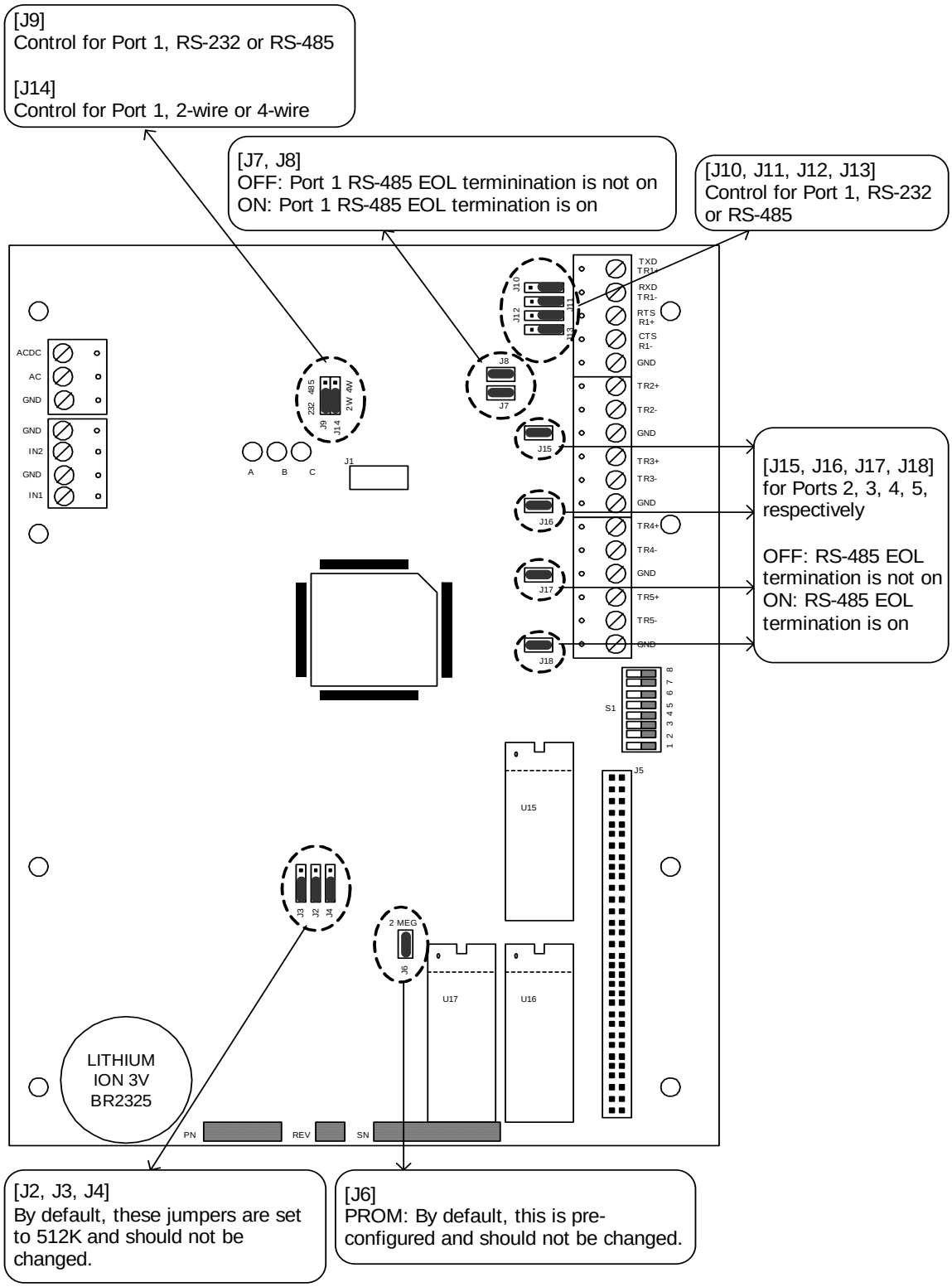
PASSWORD STATUS	DIP SWITCH 8:
Encryption is optional	off
Encryption is required	ON

Turn DIP switch 8 ON to enhance security. When a host system attempts to communicate with an encryption-enabled controller, a proper master key is required.

Note: The controller only reads DIP switch settings when it is powered up. If DIP switch settings are changed, the controller must go through a power cycle before the changes are seen.

13.2 Installing Jumpers

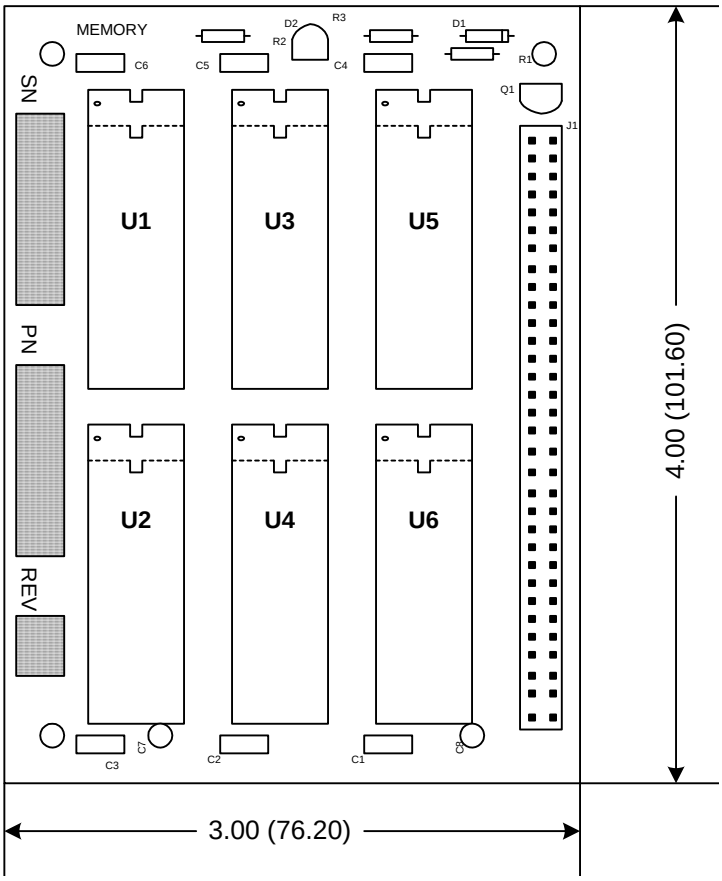
The following diagram describes the use of each jumper on the ISC board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.



13.2.1 Memory Expansion Board (OPTIONAL)

The Memory Expansion card for the ISC processor allows for additional memory to be added when the database requirement exceeds the capacity of the base memory on the ISC processor. The Memory card accommodates 3 banks of low power static RAMs for up to a total of 3 MB. The memory is backed up by the lithium cell on the ISC processor.

Memory Expansion Card



Part #	Size	Bank1 –U1,2	Bank2 –U3,4	Bank3 –U5,6
LNL-1001-MK	1 MB	512 K x8		
LNL-1003-MK	3 MB	512 K x8	512 K x8	512 K x8

SRAM type – Low power, low volt data retention, Samsung KM684000BLP-10L (or equivalent) for the 512K chip, or Samsung KM681000BCP-7 (or equivalent) for the 128K chip.

13.2.2 RS-485 Cable Termination from Host to ISC

The device used to convert RS-232 communication to RS-485 determines the termination necessary for this segment of the RS-485 communication bus. These communications devices, pre-bias the RS-485 signal,

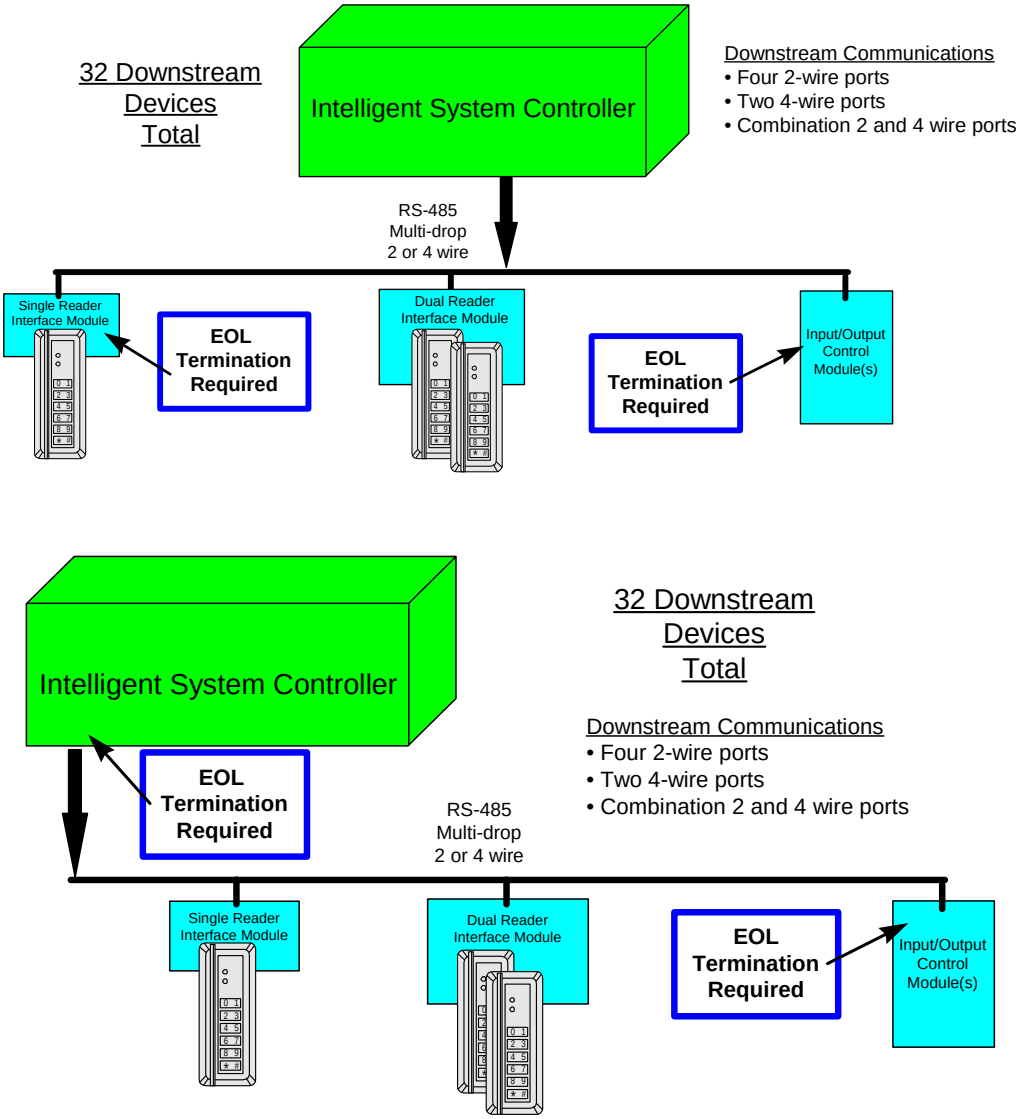
which marks the state of the signal being sent and allows the line to flow for reliable communications. This is true for most devices that are used for Host to ISC communications, but any device that has been approved by Lenel will indicate how termination should be configured for proper operation in its documentation.

13.2.3 RS-485 Cable Termination from ISC to Downstream Modules

Termination of this section of the RS-485 bus always remains the same. Each end of the RS-485 bus must be terminated using the on-board jumpers provided with each piece of hardware. Please refer to the termination drawings for each component being installed in this hardware manual.

Note: This applies to ports 2, 3, 4, and 5.

Typical Downstream Communication Configuration
(note where EOL terminators are required)

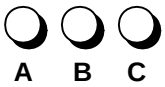


14 Maintenance

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

14.1 Verification

The ISC board contains three Status LEDs (LED A, LED B, LED C) that can be used to verify correct installation after power up.



The following chart describes the purpose of each LED on the ISC board.

LED	Purpose
A	This LED blinks rapidly whenever the ISC is powered up and is operating normally.
B	This LED is on when upstream communication to host computer is in process.
C	This LED is on when downstream communication to reader interfaces or input/ output modules is in process.

14.2 Replace Memory Backup Battery

The ISC contains a Memory Backup battery that is used to backup configuration data and event buffer data in the event of a power failure.

A 3V lithium ion battery (Rayovac BR2325 or Wuhan Lixing CR2330) is used for the Memory Backup. This battery should be replaced annually.

Caution: There is a danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with the manufacturer's instructions.

15 Specifications

The ISC is for use in low voltage, class 2 circuits only.

- Primary Power: (DC or AC)
  - DC input: 12 VDC ± 15%. 350mA
  - AC input: 12 VAC ± 15%. 600mA RMS
- Memory and Clock Backup: 3 V lithium, type BR2325
- Communication Ports:
  - Port 1: RS-232 or RS-485 (2-wire or 4-wire), 9600 to 38400 bps async
  - Ports 2-5: RS-485 (2-wire or 4-wire), 9600 to 38400 bps async
- Inputs:
  - Cabinet Tamper Monitor: unsupervised, dedicated
  - Power Fault Monitor: unsupervised, dedicated
- Wire Requirements:
  - Power: 1 stranded twisted pair, 18 AWG
  - RS-485: 24 AWG stranded twisted pair(s) with shield, 4000 feet (1219 m) maximum
  - RS-232: 24 AWG stranded, 25 feet (7.6 m) maximum
  - Inputs: stranded twisted pair, 30 ohms maximum
- Environmental:
  - Temperature: Operating: 0° to 70° C (32° to 158° F)
  - Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimension: 6 in. (152 m) W X 8 in. (203 mm) L X 1 in. (25 mm) H
  - Weight: 10 oz. (290 g) nominal
- Certifications:
  - UL294 & UL1076 Listed
  - ULC Listed
  - FCC Part 15
  - FIPS 197 Certificate #306
  - CE marking
  - RoHS compliant
  - WEEE

Note: These specifications are subject to change without notice.

LNL-2000 INTELLIGENT SYSTEM CONTROLLER

16 Overview of the LNL-2000

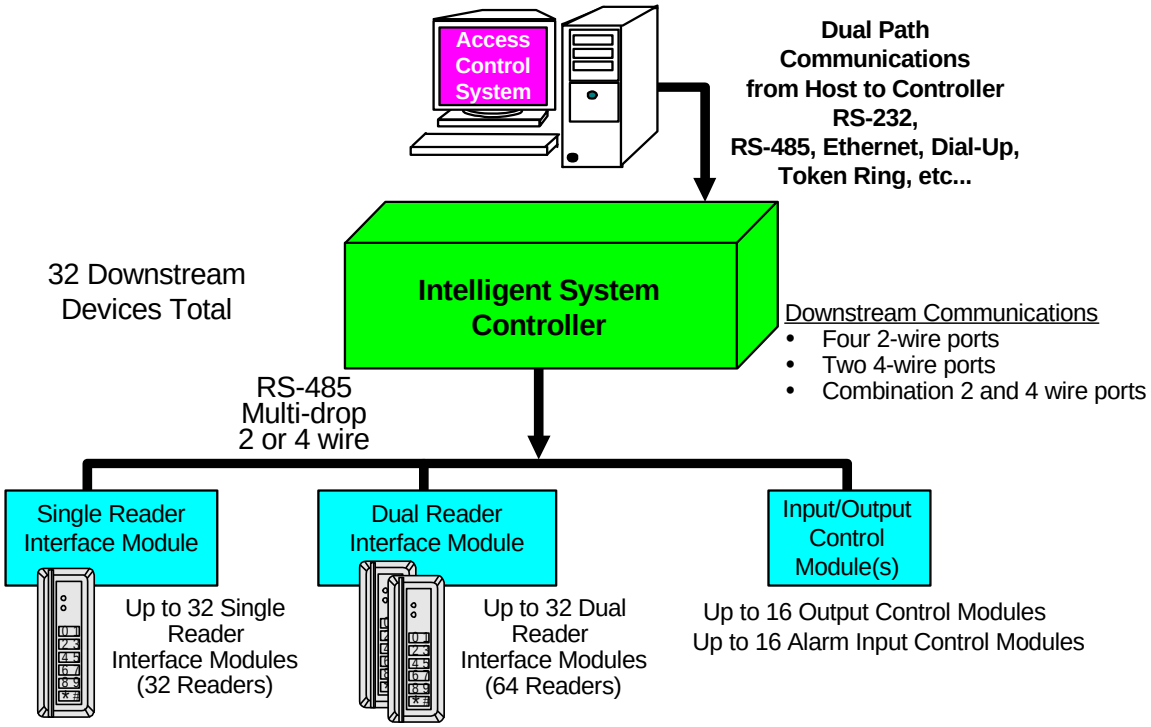
This installation guide is intended for use by technicians who will be installing and maintaining the LNL-2000 Intelligent System Controller (ISC).

The LNL-2000 provides the real time processing for the I/O interfaces connected to it. It holds the database for the subsystem configuration and cardholders, the event log buffer in battery-backed memory.

16.1 Interfaces

The ISC interfaces upstream with the Access Control software on a host system and downstream with the following Lenel field hardware components.

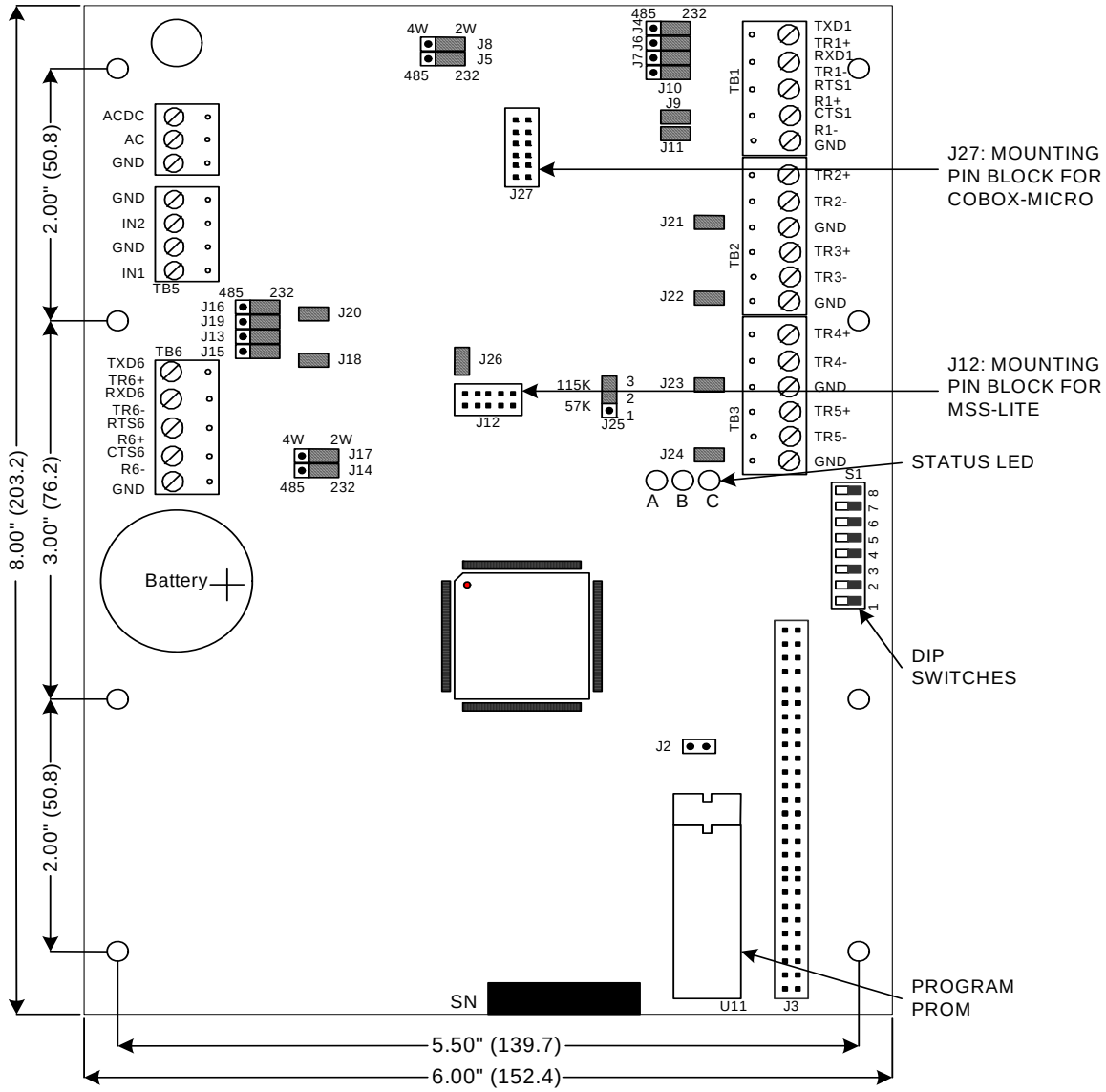
LNL-2000 Communications Overview


Access Control System
Dual Path Communications from Host to Controller RS-232, RS-485, Ethernet, Dial-Up, Token Ring, etc...
32 Downstream Devices Total
Intelligent System Controller
Downstream Communications
• Four 2-wire ports
• Two 4-wire ports
• Combination 2 and 4 wire ports
RS-485 Multi-drop 2 or 4 wire
Single Reader Interface Module
Dual Reader Interface Module
Input/Output Control Module(s)
Up to 32 Single Reader Interface Modules (32 Readers)
Up to 32 Dual Reader Interface Modules (64 Readers)
Up to 16 Output Control Modules
Up to 16 Alarm Input Control Modules

16.2 The LNL-2000 Board

The ISC board contains the following components: two (2) unsupervised alarm inputs, two (2) RS-232 or RS-485 interface, four (4) RS-485 interfaces (which can consist of four 2-wire, two 4-wire, or one 4-wire and two 2-wire interfaces), one (1) power-in input, eight (8) DIP switches, and twenty-three (23) jumpers. It also contains a set of three (3) status LEDs and one (1) memory backup (3 volt lithium) battery.

LNL-2000 board



17 Installation

To install the ISC, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
2. Wire the upstream host communication.
3. Wire the downstream device communication.
4. Wire the power input.
5. Remove the plastic safety strip from the memory backup battery.

17.1 Wiring

17.1.1 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

The LNL-2000 features two alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the Input 2 (IN2) and Input 1 (IN1) contact terminals on the ISC board.

Input 2 and Input 1 are both simple N/C (normally closed) contact closure monitors.

Note: If either of these inputs is not used, a shorting wire should be installed.

Unsupervised Alarm Input Wiring

17.1.2 Upstream Host Communication

Configuration data and event/status reports are communicated via port 1 (primary) or port 6 (secondary), the host ports. RS-232 interface is for direct one to one connection to a host computer port, via modem or a plug-in ethernet module. When the ethernet module is used, port 1 must be configured as a RS-232 interface. I/O devices are connected via port 2 through port 5.

Port 1 may be set up as a RS-232 interface or a RS-485 interface. RS-485 interface may be 2-wire or 4-wire type.

Port 6 may be set up as RS-232 interface or a RS-485 interface. RS-485 interface may be 2-wire or 4-wire type.

Direct-connect RS-232 cables should be no longer than 50 feet. Leased lines or fiber optics can also be used.

RS-232 Communications

The RS-232 communications interface is for short distance wiring or point to point communications. A number of products provide RS-232 interfaces such as connections to modem, PC, etc. This interface is intended for a short distance communication because its high impedance is more susceptible to noise. Cable length is generally limited to 50 feet (15m). If required, this distance may be extended to a few hundred feet by using low capacitance shielded cables. The optimal cable is a (Belden 9610) or equivalent wire.

For direct connections (via RS-232) between the LNL-2000 and the host, 115,200 baud is not recommended unless the third-party hardware devices used support a CTS/RTS hardware handshake at the UART level. The Microsoft serial device drivers do not support hardware handshaking at this level. The 115,200 baud rate can be used for the RS-232 connection between the LNL-2000 and the Lantronix devices that support 115,200 baud.

RS-485 Communications

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distance (4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances End-of-line (EOL) termination is required.

RS-485 communication requires a 24 AWG (minimum) twisted pair (with shields) cable. Either a 2-wire or 4-wire RS-485 cable configuration can be used. The RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms minimum impedance (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102, West Penn, or equivalent). Install a termination jumper only for end of line unit(s).

When connecting to the host via RS-485 (2-wire or 4-wire), do not use the 115,200 baud rate because there is no hardware handshake capability. For reliable communication with this baud rate, CTS on the host must be connected to RTS on the controller; RS-485 communication does not provide this.

When connecting a controller to a Lantronix device, do not use RS-485 communication. This particular configuration also lacks hardware handshake signals. RTS on the Lantronix must be connected to CTS on the controller. At 115,200 baud, CTS on the Lantronix must be connected to RTS on the controller as well, which is not provided via RS-485.

RS-485 Line Termination

RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling.

Each component provided has an on-board termination. It is up to the installer to determine which device is at the end of the communication line.

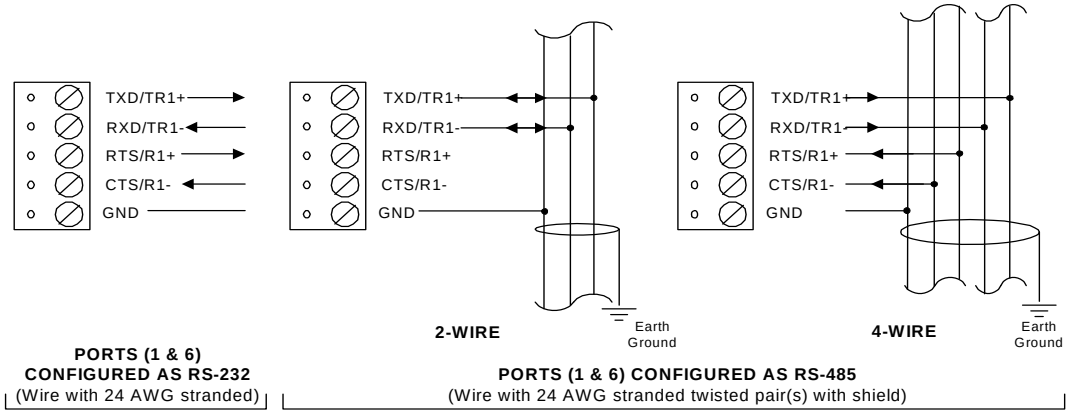
Belden Wire Specifications

Trade Number UL NEC Type CSA Certification	Number of Pairs	Nominal D.C. R. Conductor	Shield	Nominal Impedance (Ohms)	Nominal Capacitance	
					pF/feet	pF/ meter
9841 NEC CM CSA	1	24.0 ohms/M 78.7 ohms/ km	3.35 ohms/M 11.0 ohms/K	120	12.8	42
9842 NEC CM CSA	2	24.0 ohms/M 78.7 ohms/ km	2.2 ohms/M 7.2 ohms/K	120	12.8	42
88102 NEC CMP CSA	2	24.0 ohms/M 78.7 ohms/ km	15.5 ohms/M 50.9 ohms/km	100	12.95	42

Notes: If RS-485 communication is used, an RS-232 to RS-485 converter is required at the host workstation. Use part # HO-2064.

The 2-wire configuration is recommended over the 4-wire for RS-485.

Upstream Host Communication Wiring

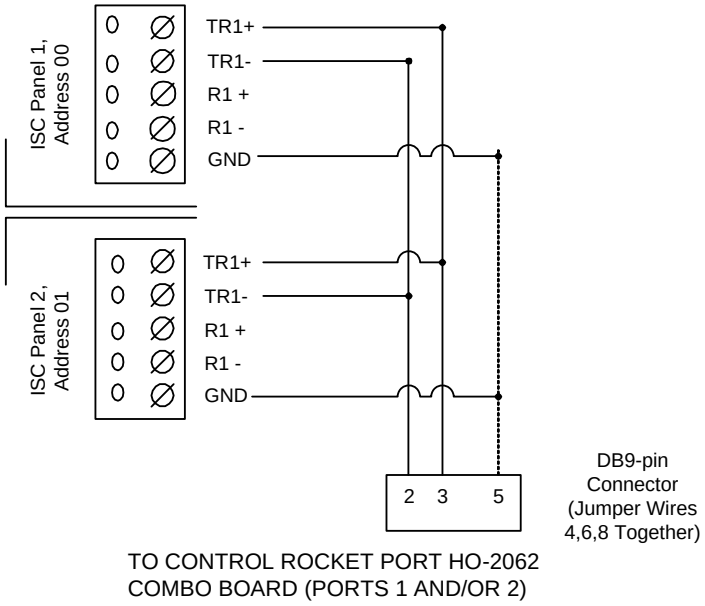


Ports 1 and 6-wiring configuration. This configuration will work for Direct connect (RS-232) and Lantronix Ethernet network communications. With direct connect and with Lantronix, DIP Switch 5 needs to be ON using connection cables provided by Lenel.

ISC	9-pin connector	25-pin connector
TXD/TR1+	pin 2	pin 3
RXD/TR1-	pin 3	pin 2
RTS/R1+	This is used for 115,200 baud rate.	
CTS/R1-	pin 7	pin 4
GND	pin 5	pin 7
Jumper together	4,6 & 8	5,6 & 20

2-Wire RS-485 from Host

2-WIRE MULTIDROP RS-485 FROM HOST
(Maximum of 8 control panels)



Wire Configuration- Switch #5 must be off for all panels in this configuration.

Panel 1		Panel 2	
Jumper	**Setting**	**Jumper**	**Setting**
J4, J6, J7, J10	ON pin 1 & 2	J4, J6, J7, J10	ON pins 1 & 2
J8	ON 2W pins 2 & 3	J8	ON 2W pins 2 & 3

Panel 1		Panel 2	
Jumper	**Setting**	**Jumper**	**Setting**
J5	ON 485 pins 1 & 2	J5	ON 485 pins 1 & 2
J9, J11	Termination ON	J9, J11	Termination ON

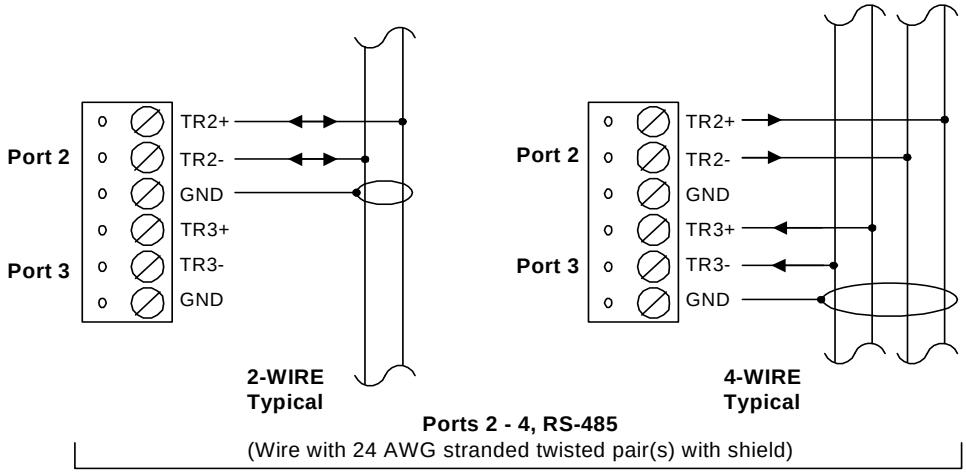
17.1.3 Downstream Device Communication

The ISC can be configured to communicate downstream with up to 16 input/output devices, using Port 2, Port 3, Port 4, and Port 5. Each of these ports can be wired only as an RS-485 (2-wire) interface, for multi-drop communication on a single bus of up to 4000 feet. If 4-wire communication is required, ports 2/3 and ports 4/5 may be setup as two 4-wire interface via host configuration.

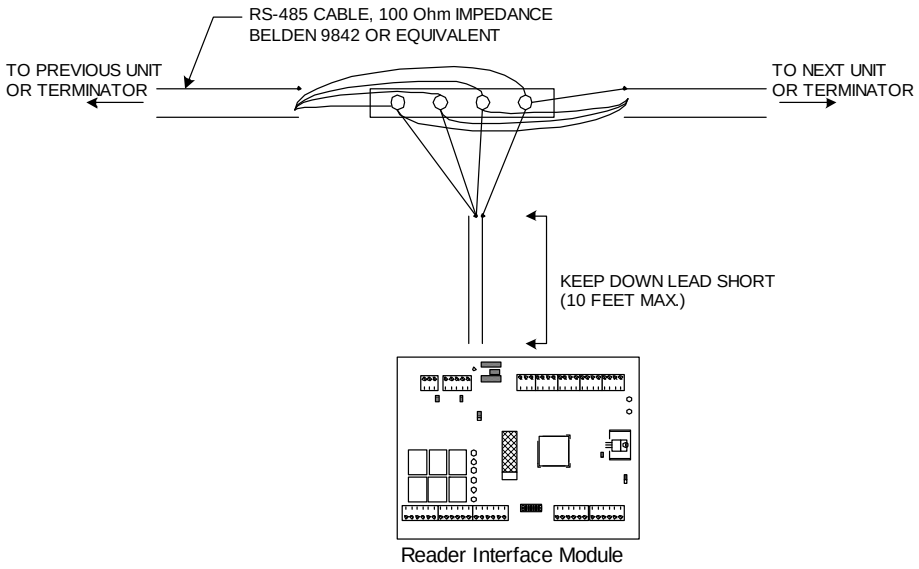
Ports 2-5 are defaulted to 2-wire, RS-485 communications that may be configured for either 2-wire or 4-wire operation. The interface allows a multi-drop communication on a single bus of up to 4000 feet (1,200 m). Use twisted pairs (minimum 24 AWG) with shield for the communication. Install termination jumper only for end of line unit(s) only.

Each RS-485 line should contain only 2 terminators, one at each end of the bus.

Downstream Device Communication Wiring (Ports 2-5)



RS-485 Communication Wiring



To configure all four downstream ISC ports as 2-wire RS-485, follow the 2-wire diagram and repeat on each set of three terminators, TRX+, TRX-, GND.

To configure as two 4-wire RS-485 ports, follow the 4-wire diagram:

Port 2/3:	(Transmit) TR2+, TR2-	(Receive) TR3+, TR3-	GRD
Port 4/5:	(Transmit) TR4+, TR4-	(Receive) TR5+, TR5-	GRD

or combine 2-wire and 4-wire RS-485:

Port 2/3: 4-wire	(Transmit) TR2+, TR2-	(Receive) TR3+, TR3-	GRD
Port 4: 2-wire	TR4+, TR4-		GRD
Port 5: 2-wire	TR5+, TR5-		GRD

Notes: The ISC can be located anywhere along the RS-485 line.

Install an RS-485 terminator for each end-of-line device.

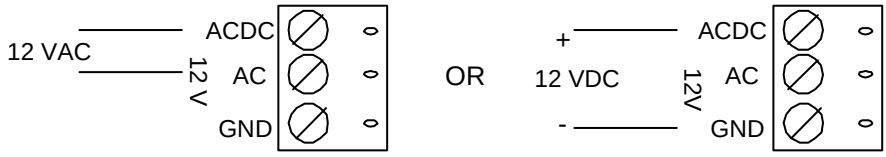
17.1.4 Power

The ISC accepts either 12 VDC or 12 VAC.

- Locate power source as closed to the unit as possible.
- Connect power with minimum of 18 AWG power cable.
- For AC power sources, the following lines are required: AC Line (L), AC Neutral (N). These lines must not be interchanged. A 650 mA RMS current is required for AC power supplies.
- For DC power sources, isolated and non-switching, regulated DC power is required. A 400 mA current is required for DC power supplies.

Note: Observe polarity for 12 VDC applications.

Power Source Wiring



17.1.5 Other

Remove the factory-installed plastic safety strip from the memory backup battery. This plastic strip prevents the battery from being effectively seated. The battery will not function properly until the plastic strip is removed. When the battery is enabled, all volatile RAM is protected. This should be the last step when installing the ISC.

A 3 V Lithium Ion battery (Rayovac BR2325 or Wuhan Lixing CR2330) is used for the memory backup.

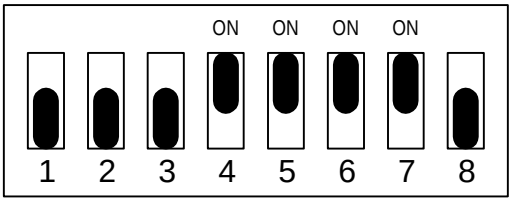
Note: You must first remove the plastic strip to enable the battery.

18 Configuration

The ISC board contains 8 DIP switches and 23 jumpers that must be configured appropriately for your system.

18.1 Setting DIP Switches

DIP Switches (default)



The following chart describes the use of each DIP Switch

DIP SWITCH(ES)	USED TO CONFIGURE:
1, 2, 3	Processor address (0 - 7)
4	Port 6: Hardware Flow Control (ON, by default)
5	Port 1: Hardware Flow Control (ON, by default)
6, 7	Communication baud rate (115200, *38400 - default*, 19200, 9600 bps)
8	Communication password status (“required”, “not required”)

18.1.1 Processor Address

To configure the processor address, set DIP switches 1, 2, and 3 according to the following table.

Address	DIP SWITCH		
	1:	2:	3:
0 (default)	off	off	off
1	ON	off	off
2	off	ON	off
3	ON	ON	off
4	off	off	ON
5	ON	off	ON
6	off	ON	ON
7	ON	ON	ON

18.1.2 Hardware Flow Control

To configure the hardware flow control status, set DIP switches 4 and 5 according to the following table. Leave this feature set to ON for Lantronix, dial-up, and RS-232, and OFF for RS-485 communication.

HANDSHAKE STATUS	DIP SWITCH 4 (for port 6):	DIP SWITCH 5 (for port 1):
Hardware Flow Control	ON	ON
None	off	off

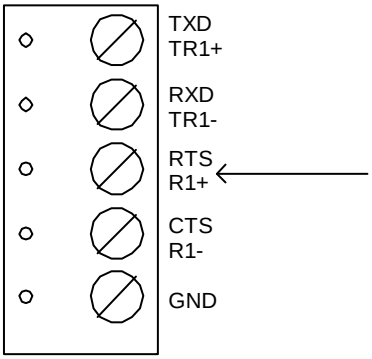
18.1.3 Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table. DIP switches 6 and 7 control the communication baud rate for port 1 only. Port 6 is fixed at 38400 bps.

BAUD RATE	DIP SWITCH	
	6:	7:
38400 bps	ON	ON
19200 bps	off	ON
9600 bps	ON	off
115,200 bps*	off	off

Note: The 115,200 baud rate is supported for use with a Lantronix device. If using a direct connection to the host workstation, the operating system must be Windows 2003.

In order to communicate with an ISC at 115,200 bps, an extra wire is required in the RS-232 cable, connected to RTS/R1+.



For a 9-pin cable,

- Jumper pins 4 and 6 together.
- Connect pin 8 to RTS/R1+ on the LNL-2000.

For a 25- pin cable,

- Jumper pins 6 and 20 together.
- Connect pin 5 to RTS/R1+ on the LNL-2000.

18.1.4 Communication Password Status

DIP switch 8 controls the utilization of encryption.

The ISC supports encryption with use of AES firmware. The controller must have a 256 KB chip. If you wish to use this feature and have a controller with a 128 KB chip, it must be upgraded.

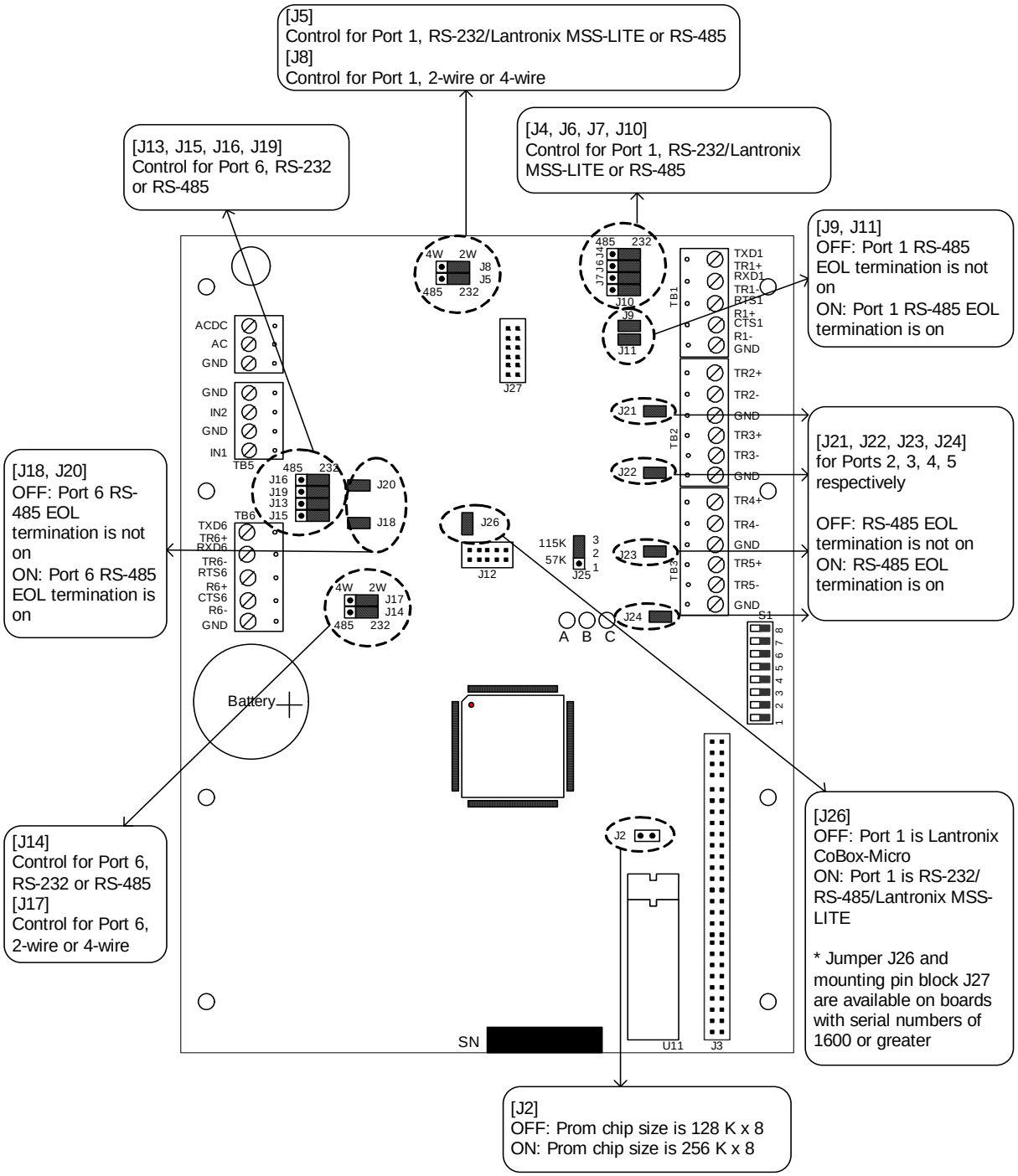
PASSWORD STATUS	DIP SWITCH 8:
Encryption is optional	off
Encryption is required	ON

Turn DIP switch 8 ON to enhance security. When a host system attempts to communicate with an encryption-enabled controller, a proper master key is required.

Note: The controller only reads DIP switch settings when it is powered up. If DIP switch settings are changed, the controller must go through a power cycle before the changes are seen.

18.2 Installing Jumpers

The following diagram describes the use of each jumper on the ISC board. The jumper is indicated by brackets [ ]. The default shipping position is shown.


[J5]
Control for Port 1, RS-232/Lantronix MSS-LITE or RS-485
[J8]
Control for Port 1, 2-wire or 4-wire
[J13, J15, J16, J19]
Control for Port 6, RS-232 or RS-485
[J4, J6, J7, J10]
Control for Port 1, RS-232/Lantronix MSS-LITE or RS-485
[J9, J11]
OFF: Port 1 RS-485 EOL termination is not on
ON: Port 1 RS-485 EOL termination is on
[J21, J22, J23, J24]
for Ports 2, 3, 4, 5 respectively
OFF: RS-485 EOL termination is not on
ON: RS-485 EOL termination is on
[J18, J20]
OFF: Port 6 RS-485 EOL termination is not on
ON: Port 6 RS-485 EOL termination is on
[J14]
Control for Port 6, RS-232 or RS-485
[J17]
Control for Port 6, 2-wire or 4-wire
[J26]
OFF: Port 1 is Lantronix CoBox-Micro
ON: Port 1 is RS-232/ RS-485/Lantronix MSS-LITE
* Jumper J26 and mounting pin block J27 are available on boards with serial numbers of 1600 or greater
[J2]
OFF: Prom chip size is 128 K x 8
ON: Prom chip size is 256 K x 8
Battery
SN
TB1
TB2
TB3
TB5
TB6
J27
J12
U11
J3
S1

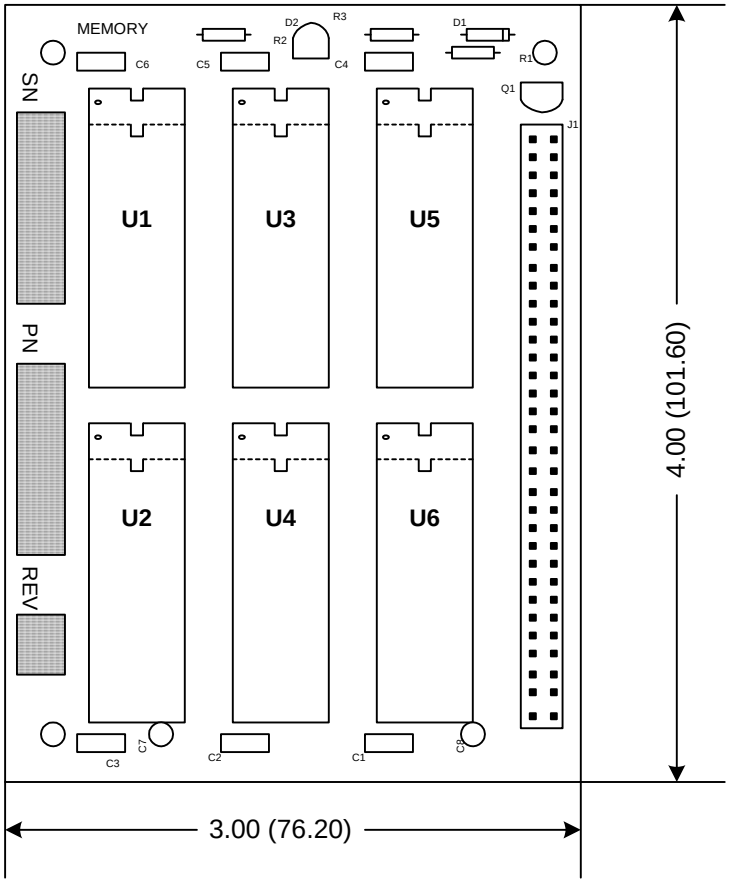
18.2.1 RAM Chip Size

The LNL-2000 comes with permanently mounted 1 MB RAM installed.

18.2.2 Memory Expansion Board (Optional)

The Memory Expansion card allows for additional memory to be added when the database requirement exceeds the capacity of the base memory on the ISC. The Memory card accommodates 3 banks of low power static RAMs for up to a total of 3 Megabytes. The memory is backed up by the lithium cell.

Memory Expansion Card



Part #	Size	Bank1-U1,2	Bank2-U3,4	Bank3-U5,6
LNL-1001-MK	1 MB	512 K x8		
LNL-1003-MK	3 MB	512 K x8	512 K x8	512 K x8
LNL-1007-MK	7 MB	Fixed memory		

SRAM type- Low power, low volt data retention, Samsung KM684000BLP-10L (or equivalent) for the 512 K chip.

18.2.3 RS-485 Cable Termination from Host to ISC

The device used to convert RS-232 communication to RS-485 determines the termination necessary for this segment of the RS-485 communication bus. These communications devices, pre-bias the RS-485 signal, which marks the state of the signal being sent and allows the line to flow for reliable communications. This is true for most devices that are used for Host to ISC communications, but any device that has been approved by Lenel will indicate how termination should be configured for proper operation in its documentation.

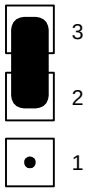
18.2.4 RS-485 Cable Termination from ISC to Downstream Modules

Termination of this section of the RS-485 bus always remains the same. Each end of the RS-485 bus must be terminated using the on-board jumpers provided with each piece of hardware. Please refer to the termination drawings for each component being installed in this hardware manual.

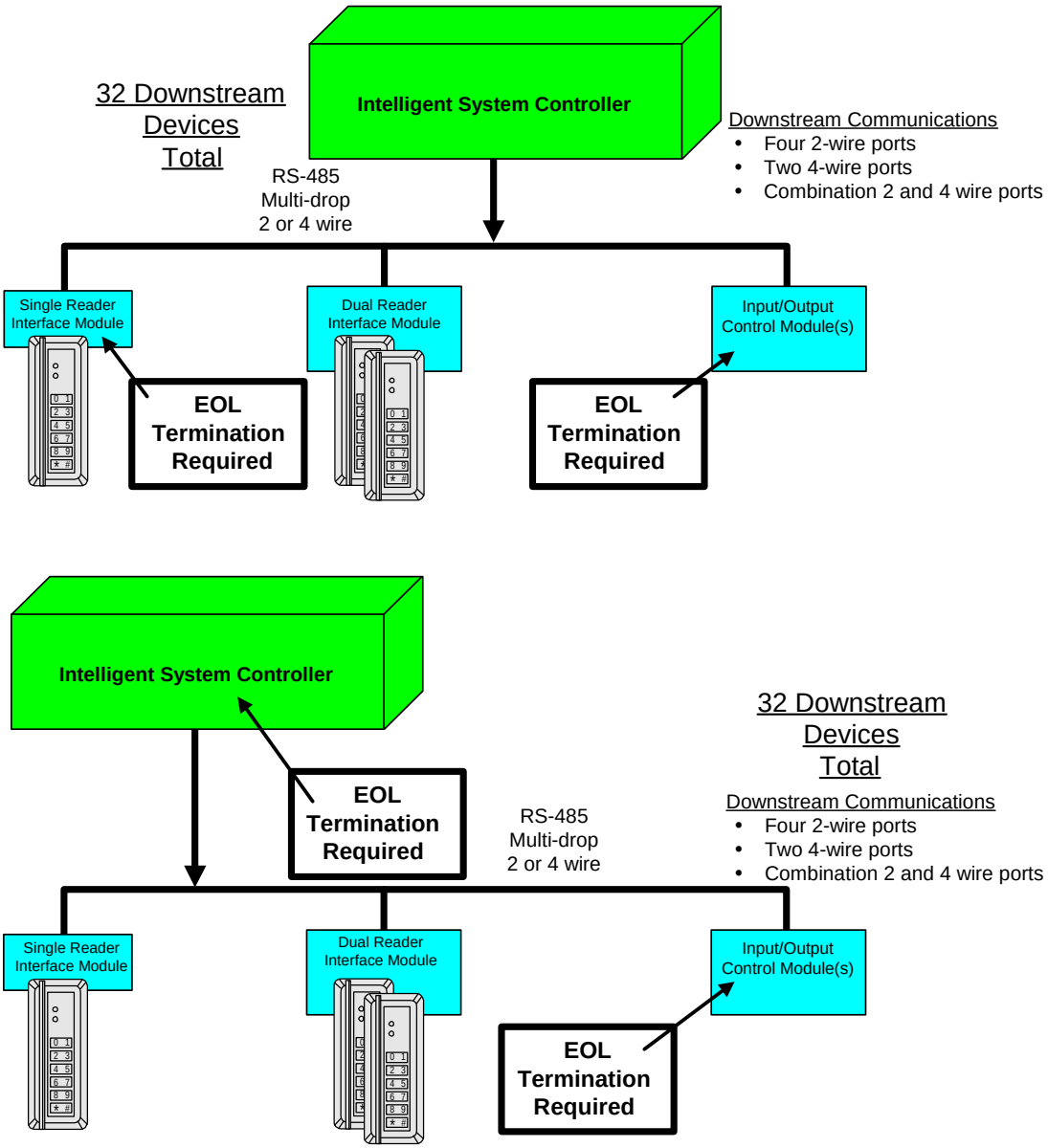
Note: This applies to Ports 2, 3, 4, and 5.

18.2.5 Baud Rate Default

Jumper J25 is used to configure the default baud rate for port 1 on the ISC board. This jumper should be set to 115 Kbps, which is setting 2-3 on the ISC board. This jumper should be set for 2-3 and should not be changed to anything else.



Typical Downstream Communication Configuration (note where EOL terminators are required)

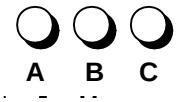


19 Maintenance

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

19.1 Verification

The board contains three Status LEDs (LED A, LED B, LED C) that can be used to verify correct installation and power up.



The following chart describes the purpose of each LED on the LNL-2000 board.

LED	Purpose
A	This LED blinks rapidly whenever the ISC is powered up and is operating normally.
B	This LED is on when upstream communication to host computer is in progress.
C	This LED is on when downstream communication to reader interfaces or input/ output modules is in process.

19.2 Replace Memory Backup Battery

The ISC contains a memory backup battery that is used to backup configuration data and event buffer data in the event of a power failure.

A 3V lithium ion battery (Rayovac BR2325 or Wuhan Lixing CR2330) is used for the memory backup. This battery should be replaced annually.

Caution: There is a danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with the manufacturer's instructions.

20 Specifications

**The LNL-2000 is for use in low voltage, class 2 circuits only.

- Primary Power: (DC or AC)
  - DC input: 12 VDC ± 10%, 400 mA (550 mA with NIC) recommended
  - AC input: 12 VAC ± 15%, 650 mA RMS (800 mA RMS with NIC)
- Memory and Clock Backup: 3 Volt Lithium, Rayovac BR2325 or Wuhan Lixing CR2330
- Data Memory: 1 MB standard (optional memory module) available
- Ports:
  - Port 1, 6: RS-232 or RS-485, 9600 to 115,200 bps, async
  - Port 2-5: RS-485, 2-wire, 2400 to 38400 bps, async
- Inputs: two unsupervised, dedicated, for local tamper
  - Power:1 stranded twisted pair, 18 AWG
  - RS-485: 24 AWG, 4000 feet (1200 m) max., stranded twisted pair(s) with shield.
  - RS-232: 24 AWG stranded, 25 feet (7.6m) max.
  - Alarm input: 1 stranded twisted pair, 30 ohms max.
- Environmental:
  - Temperature: 0 to 70 ° C operating, -55 to +85° C storage
  - Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimensions: 6 x 8 x 1 in. (152 x 203 x 25 mm)
  - Weight: 10 oz. (284 g) nominal
- Certifications:
  - UL294 & UL1076 Listed
  - ULC Listed
  - FCC Part 15
  - C-Tick
  - FIPS 197 Certificate #307
  - CE marking
  - RoHS compliant
  - WEEE

Note: These specifications are subject to change without notice.

LNL-2210 INTELLIGENT SINGLE DOOR CONTROLLER

21 Overview of the LNL-2210

This controller provides a single door solution with either a single reader or two readers for ingress/egress operation. It holds the database for the hardware configuration, and cardholder database in nonvolatile memory. The event log buffer is stored in battery backed memory.

The first reader port can accommodate readers that utilize D1/D0, Clock/Data. or OSDP 2-wire RS-485 electrical signaling, one or two wire LED controls, and buzzer control (one wire LED mode only). The second reader port can accommodate readers that utilize D1/D0, Clock/Data, one or two wire LED controls, and buzzer control (one wire LED mode only).

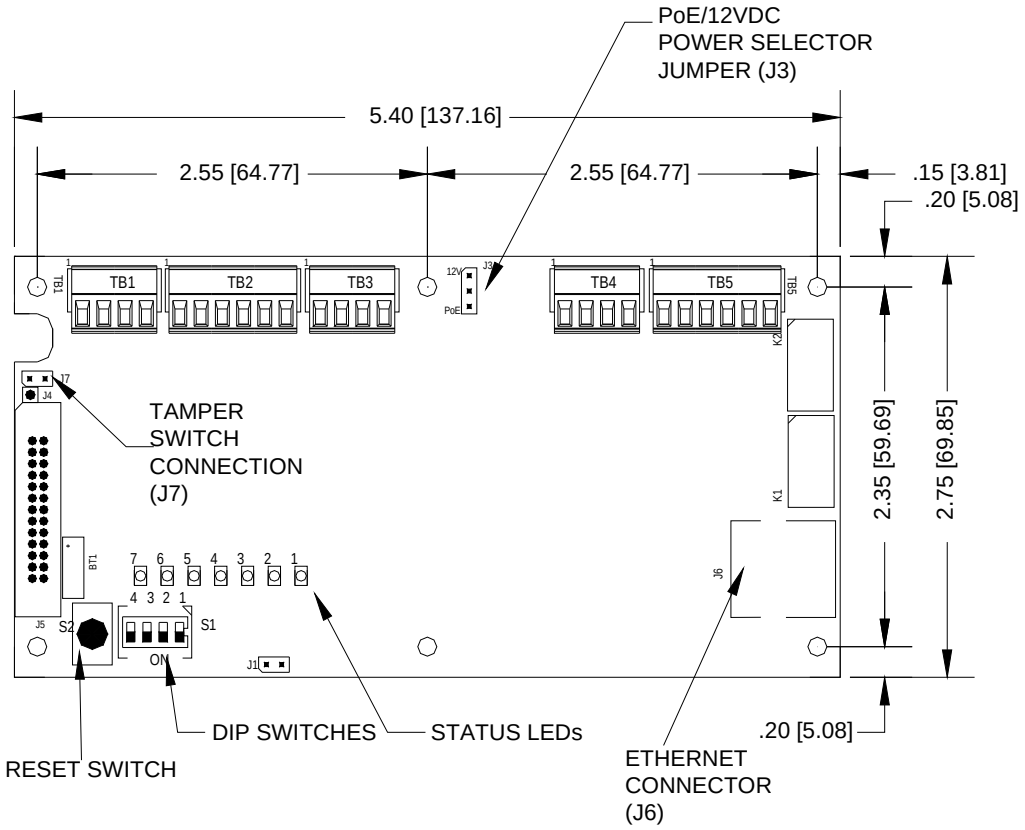
Form-C relay outputs may be used for strike control or alarm signaling. The relay contacts are rated at 2A @ 30 VDC, dry contact configuration. Inputs are provided for monitoring the door contact, exit push button, or alarm contact. The controller requires either 12 VDC for power or Power over Ethernet (PoE).

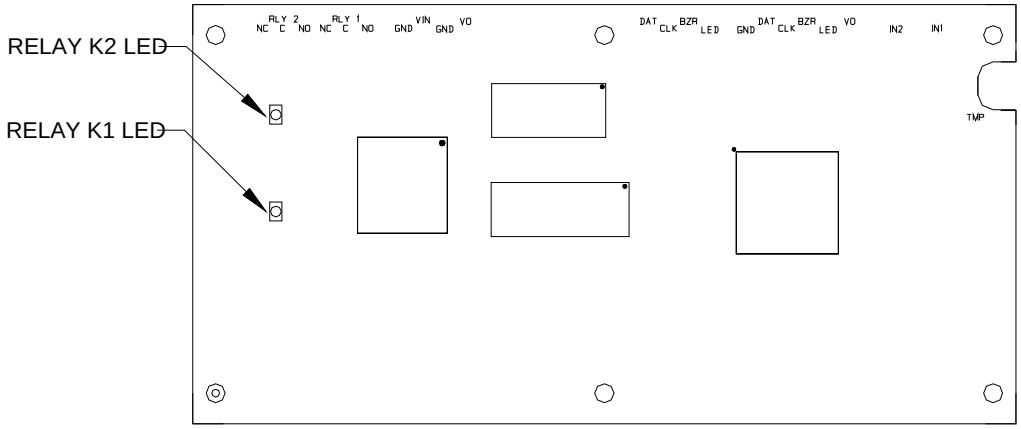
The intelligent single door controller may be mounted in a 3-gang switch box; a mounting plate is supplied with the unit. The controller may be mounted in an enclosure; the supplied mounting plate has mounting holes that match the LNL-1300 mounting footprint.

21.1 The LNL-2210 Board

The board contains the following components: one (1) host Ethernet interface, one (1) power-in input, two (2) unsupervised/supervised inputs, two (2) reader interfaces, two (2) output relays, four (4) DIP switches, seven (7) jumpers, seven (7) status LEDs, and one (1) reset switch.

The LNL-2210 Board





SOLDER SIDE

22 Installation

To install the intelligent single door controller, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the device for communication.
2. Wire readers.
3. Wire the input circuit.
4. Wire the relay circuit.
5. Supply power to the controller.
6. Remove the plastic safety strip from the memory backup battery.
7. Configure the correct settings using the jumpers and DIP switches.
8. Set the board for the desired initial IP addressing mode.
9. Configure the network and port settings using the embedded web server.

22.1 Wiring and Setup

Refer to the following table for wiring and setup of the LNL-2210.

Connections		
TB1-1	IN1	Input 1
TB1-2	IN1	
TB1-3	IN2	Input 2
TB1-4	IN2	
TB2-1	VO	Reader 1 Power Output – 12 VDC
TB2-2	LED	Reader 1 LED Output
TB2-3	BZR	Reader 1 Buzzer Output
TB2-4	CLK	Reader 1 CLK/Data 1/TR+
TB2-5	DAT	Reader 1 DAT/Data 0/TR-
TB2-6	GND	Reader 1 Ground
TB3-1	LED	Reader 2 LED Output
TB3-2	BZR	Reader 2 Buzzer Output
TB3-3	CLK	Reader 2 Buzzer Output
TB3-4	DAT	Reader 2 DAT/Data 0 Input
TB4-1	VO	Auxiliary Power Output – 12 VDC

Connections		
TB4-2	GND	Auxiliary Power Output Ground
TB4-3	VIN	Input Power – 12 VDC (from local power supply)
TB4-4	GND	Input Power Ground
TB5-1	NO	Relay K1 – Normally Open Contact
TB5-2	1-C	Relay K1 – Common Contact
TB5-3	NC	Relay K1 – Normally Closed Contact
TB5-4	NO	Relay K2 – Normally Open Contact
TB5-5	2-C	Relay K2 – Common Contact
TB5-6	NC	Relay K2 – Normally Closed Contact

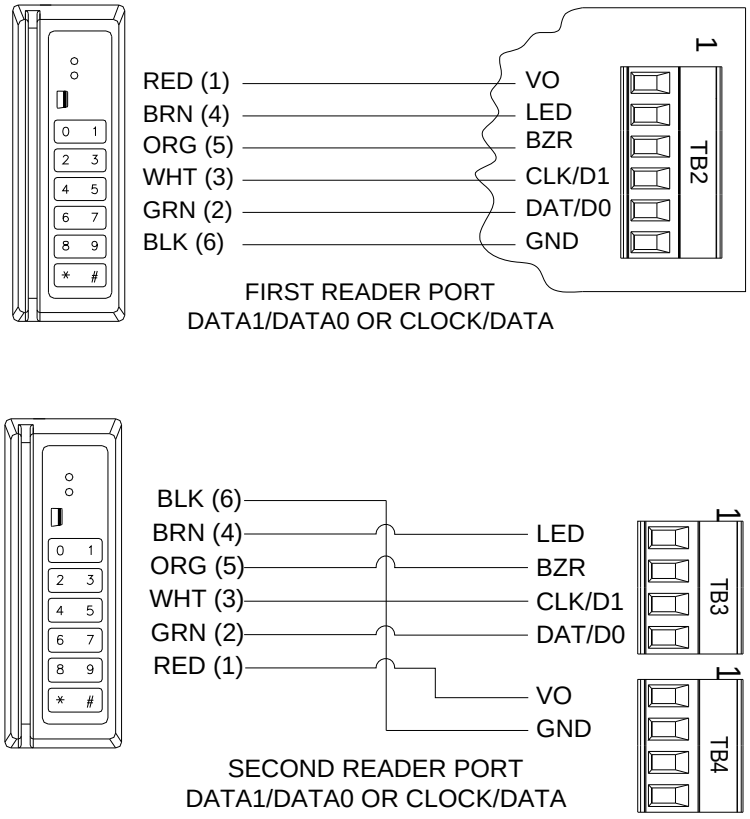
22.1.1 Communication Wiring

The controller communicates to the host via the onboard 10-Base-T/100Base-TX Ethernet interface (port 0).

22.1.2 Reader Wiring

The first reader port supports readers that utilize D1/D0, Clock/Data, or OSDP 2-wire RS-485 electrical signaling. The second reader port supports readers that utilize D1/D0, Clock/Data. Power to the first reader is 12 VDC and is current limited to 150mA. The second reader may be powered from the auxiliary power output on TB4-1 and TB4-2. Readers that require different voltage or have high current requirements should be powered separately. Refer to the reader manufacturer specifications for cabling requirements. In the 2-wire LED mode, the Buzzer output is used to drive the second LED. Reader port configuration is set via the host software.

Reader wiring



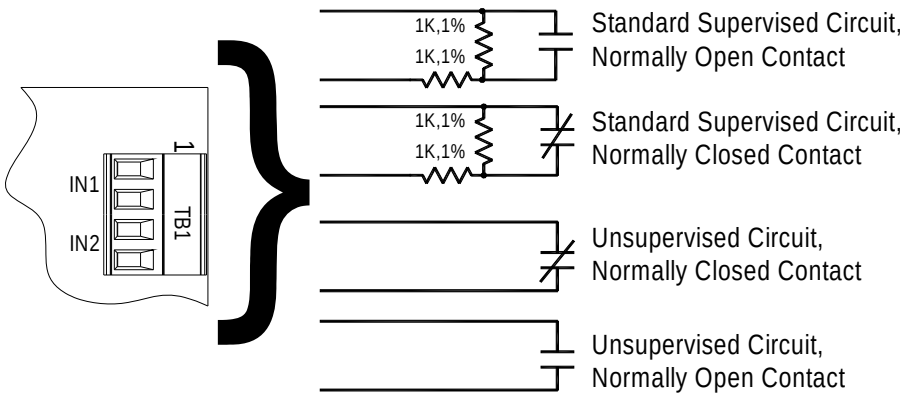
22.1.3 Input Circuit Wiring

Typically, these inputs are used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When unsupervised, reporting consists of only the open or closed states.

When configured as supervised, the input circuit will report not only open and closed, but also open circuit, shorted, grounded*, and foreign voltage*. A supervised input circuit requires two resistors be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1K Ohm, 1% resistors and should be located as close to the sensor as possible. Custom end of line (EOL) resistances may be configured via the host software.

* Grounded and foreign voltage states are not a requirement of UL 294 and therefore not verified by UL.

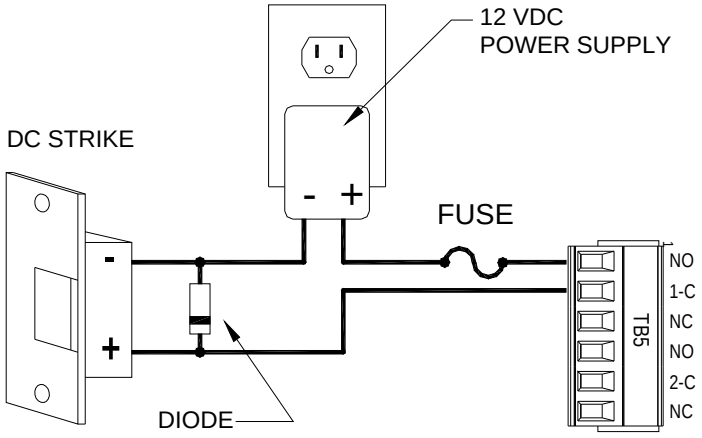
The input circuit wiring configurations shown are supported but may not be typical:



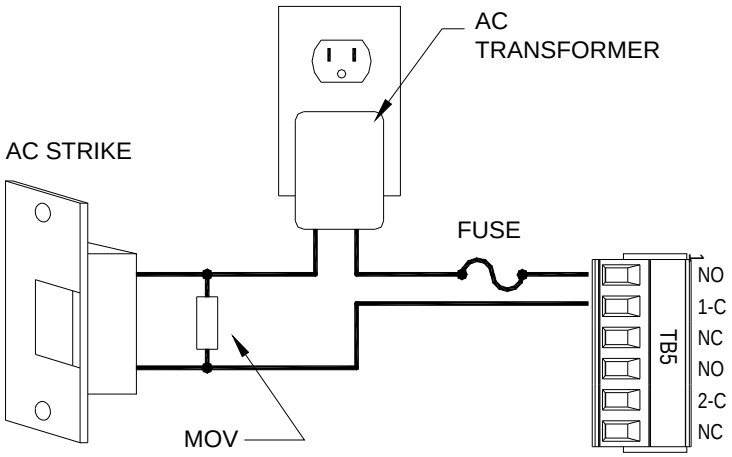
22.1.4 Relay Circuit Wiring

Two relays are provided for controlling door lock mechanisms or alarm signaling. The relay contacts are rated at 2A @ 30 VDC, dry contact configuration. Each relay has a Common pole (C), a Normally Open pole (NO) and a Normally Closed pole (NC). When you are controlling the delivery of power to the door strike, the Normally Open and Common poles are used. When you are momentarily removing power to unlock the door, as with a mag lock, the Normally Closed and Common poles are used. Check with local building codes for proper egress door installation.

Inductive door locking devices may induce relay contact arcing as the contact opens that can cause damage and premature failure of the relay. For this reason, it is recommended that either a diode or MOV (metal oxide varistor) be used to protect the relay. Wire should be of sufficient gauge to avoid voltage loss.



• **Diode Selection:** Diode current rating: 1x strike current. Diode breakdown voltage 4x strike voltage. For 12 VDC or 24 VDC strike, diode 1N4002 (100V/1A) typical.



• **MOV Selection:** Clamp voltage: 1.5x VAC RMS. For 24 VAC strike, Panasonic ERZ-C07DK470 typical.

22.1.5 Power

The LNL-2210 is powered in one of two ways:

- Power can be supplied via Ethernet connection using PoE, fully compliant to IEEE 802.3af.
- Or power can be supplied by a local 12 VDC power supply. Connect power with minimum of 18 AWG wire at TB5-3 and TB5-4.

22.2 Memory Backup Battery

The SRAM is backed up by a rechargeable battery when input power is removed. This battery should retain the data for about 2 weeks. If data in the SRAM is determined to be corrupt after power up, all data, including flash memory, is considered invalid and is erased All configuration data must be redownloaded.

Note: The initial charge of the battery may take up to 24 hours to be fully charged.

22.3 Installing Jumpers

The following chart describes each jumper.

Jumpers	Set at	Description
J1	n/a	Factory use only
J2	n/a	Factory use only
J3	PoE	The board is powered from the Ethernet connection.
	12V	The board is powered from an external 12 VDC power source connected to TB4-3 (VIN), TB4-4 (GND).
J4	n/a	Factory use only
J5	n/a	Factory use only
J6	n/a	10Base-T/100Base-Tx Ethernet Connection (Port 0)
J7		Cabinet Tamper: normally open switch

22.4 Setting Dip Switches

The switches on S1 DIP switch configure the operating mode of the processor. DIP switches are read on power-up except where noted. Pressing switch S2 causes the board to reset.

Switch	Selection:
SW1	When SW1 is on, use the default login user name and password. (This can be changed without resetting the board.) User name: `admin` Password: `password`
SW2	During power up, when SW2 is on (and SW1 is off) for the first 10 seconds, the static IP address is 192.168.0.251, and the primary path is configured for IP Server.
SW3	By default this switch is off and SSL is enabled. Turn SW3 ON to disable SSL settings.
SW4	Not used.

22.4.1 Default Settings

Each board ships with the following default configuration.

- All DIP switches are off.
- IP address: DHCP

- Communication address: 0. This must match the setting in System Administration for successful communication.
- Host port: IP server, no encryption, port 3001

22.4.2 Bulk Erase Configuration Memory

Use the bulk erase function to erase all configuration and cardholder databases.

When power is applied with S1 switches set to 1 & 2 ON and 3 & 4 OFF, there is a 10-second window that if switch 1 or 2 is changed to the OFF position, memory is erased. The LEDs flash the following pattern when in the reset window: LED 1 & 2 and LED 3 & 4 flash alternately at 0.5 second rate. When erasing memory, LED 2 flashes at a 2 second rate; DO NOT CYCLE POWER.

It takes less than 60 seconds to erase the memory. LEDs 1 and 4 flash for 10 seconds after the memory has been erased, then the board will reboot.

22.5 Initial IP Addressing Mode

The board can be configured using a fixed static IP address. In order to use a fixed static IP address, DIP switch 2 should be ON. This default address cannot be changed. If this is chosen, the static IP address is 192.168.0.251.

To communicate with the board using this address, the computer must also be on the same subnet. Usually, this requires changing the computer's network interface card settings.

22.6 Embedded Web Server

Instead of using DIP switches or jumpers to define communication and addressing, the LNL-2210 can be configured through the web interface.

22.6.1 Logging in for the First Time

There is one pre-defined user always available by turning DIP switch SW1 ON after power up. When logging on for the first time, since no other users are defined yet, the default user name and password are required for configuring this board.

After configuring ports and users, be sure to turn SW1 off.

Note: All boards have a static certificate that reflects a static IP address. This causes a warning to appear initially when trying to log in that states a problem with this website's security certificate. Although it is not recommended, proceed to the website.

22.6.2 Configuration via Web Page

The Configuration Web Page can be launched from within System Administration (only if an IP address or host name is specified) or by using a browser to access the programmed IP address. Depending on your

proxy settings, you may have to allow this web page. (For more information, consult your browser's documentation or system administrator for assistance.)

1. In System Administration in the Access Panels folder, click [Configuration Web Page]. This page will launch in a browser. (You may also access this page by going to the device IP address from within the browser.)
2. Click the link to go to the login page. Log in using your user name and password. If DIP switch 1 is ON, then the default user name and password is used (`admin`, `password`). If DIP switch 1 is off, use the login that was programmed in the device. Click [Login].
3. The Home page indicates the type of device and has a Notes field. You may type in a description here. Click [Save Notes].
4. To configure network settings, click [Network].
   - If you are using DHCP, specify a host name. By default, the host name consists of "MAC" followed by the numbers of the device MAC address. With DHCP, IP settings will be configured automatically.
   - For a static IP address, specify the IP address, subnet mask, and default gateway.
   - Click [Accept].
5. To configure the host, click [Host Comm].
   a. Specify the controller's communication address.
   b. Configure the following under Primary Host Port:
      – **Connection Type**: IP Server.
      – **Data Security**: The controller is capable of Password/AES encryption.
      – **Port Number** (default 3001) Must match setting in the access control software.

      When using an IP Server connection, the controller may be configured to allow all IP addresses or only authorized IP addresses.
   c. Click [Accept].
6. To view information, click [Device Info].
   You may view the time and product ID, as well as properties that have been configured, such as firmware version, serial number, device name, DIP switches, etc.
7. For users configuration, click [Users].
   User accounts may be created, edited or deleted. Each user account has an associated user name and password, as well as a level and notes.
   a. One of three different levels may be assigned to users.
      – Level 1 — Full control
      – Levels 2 and 3 have the following permissions:

Access	View allowed	Edit allowed
Home page	Level 2: Yes (cannot edit notes) Level 3: Yes (cannot edit notes)	Level 2: No Level 3: No
Network page	Level 2: Yes Level 3: No	Level 2: No Level 3: No
Host Port page	Level 2: Yes Level 3: No	Level 2: No Level 3: No

Access	View allowed	Edit allowed
Device Info page	Level 2: Yes Level 3: Yes	n/a
Users page	Level 2: No Level 3: No	Level 2: No Level 3: No
Restore/Default page	Level 2: No Level 3: No	Level 2: No Level 3: No
Apply Setting page	Level 2: No Level 3: No	Level 2: No Level 3: No

For pages that cannot be viewed, the message is displayed when users attempt to access the page: “This page is unavailable due to one of the following reasons: your user level is not authorized to view this page, or another level 1 user is logged in at this time.”

b. Select the password strength.

- Low - The minimum password length must be six characters. None of the password strength criteria will be enforced.
- Medium - The minimum password length must be six characters. Two of the password strength criteria must be met.
- High - The minimum password length is eight characters. Three of the password strength criteria must be met. Additionally, strong passwords are checked to make sure that they are not based on the user name.

Password strength criteria:

- Uppercase alphabet characters
- Lowercase alphabet characters
- Arabic numerals (0-9)
- Non alphanumeric characters ` ! ? $ ^ * ( ) _ - + = { [}] : ; @ ~ # | < , > . ? /

  Characters " , \, &, = and % are invalid characters and cannot be used for passwords.

c. Specify the Session Timer (5 to 60 minutes). Click [Save].

d. You may disable the web server by selecting the check box. When this option is selected and SW1 is off, all ports except for the host communication port will be disabled. The configuration web page cannot be used to access the device.

e. Select the **Enable door forced open filter** check box if you do not want a forced open alarm generated if the door is opened within three seconds of it being closed.

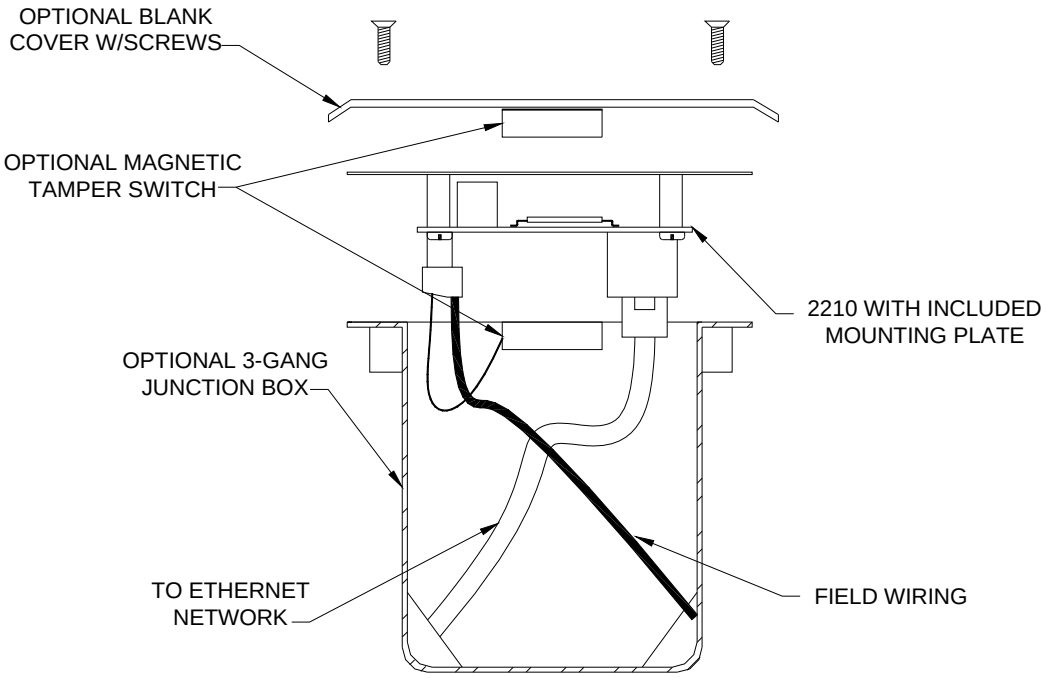
8. For configuration of auto-save, click [Auto-Save].
   a. On this page, you may restore the last save or clear all the settings.
   b. Choose to disable or enable Auto-Save. If Auto-Save is enabled, volatile memory is written to flash. The frequency of this action is specified in the timer (30 seconds to 30 minutes). Click [Save Settings].
9. You may click [Restore/Default] if you need to reload the factory settings or the current operating settings.
10. When you have completed configuring the device, click [Apply Settings], [Apply Settings, Reboot], and then [Log Out].

22.7 Additional Mounting Information

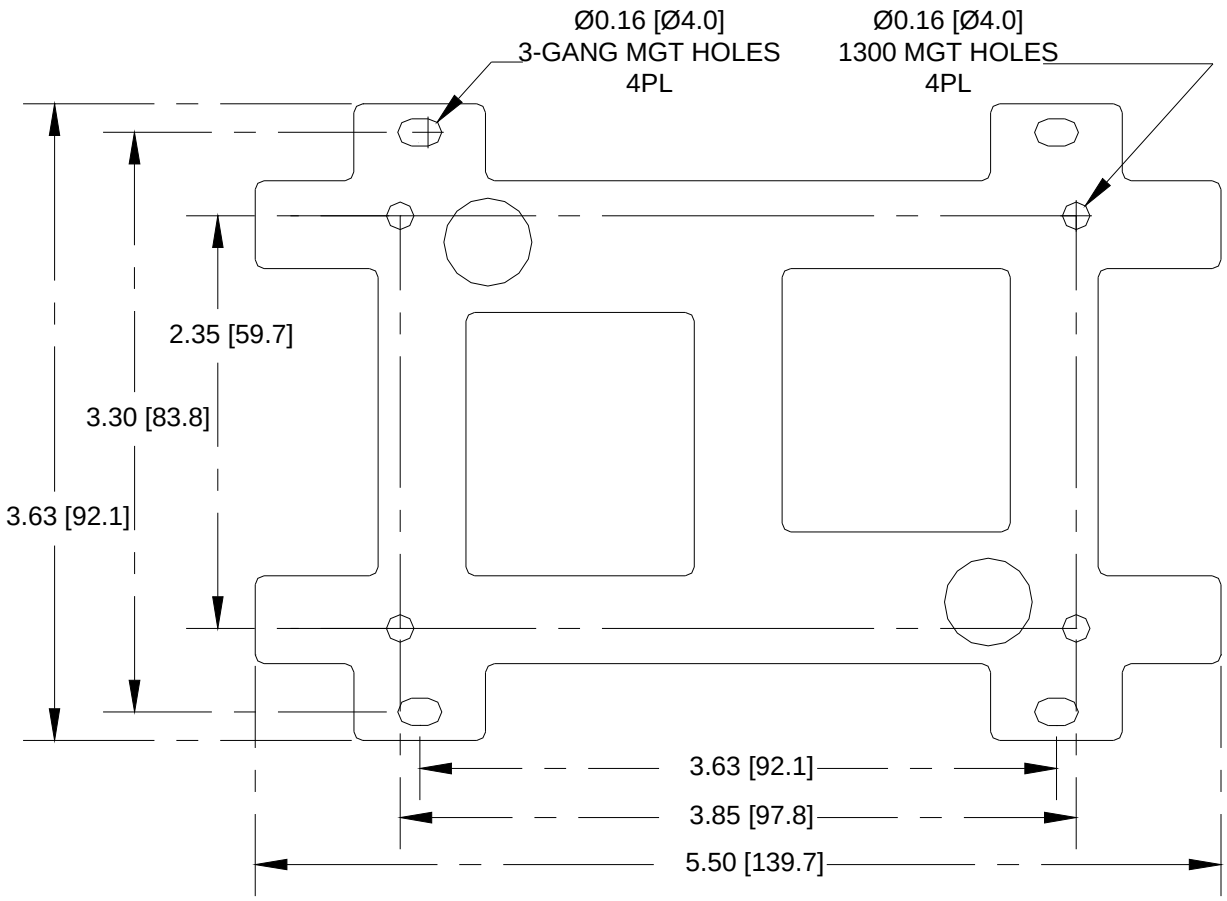
Sources for the optional items shown below:

- 3-gang stainless steel blank cover: Leviton part number 84033-40. Available from Graybar, part number 88158404
- Magnetic switch set: G.R.I. part number: 505

Side view



Mounting plate dimensions



23 Maintenance

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

23.1 Status LEDs

Power-up: All LEDs OFF.

Initialization: LEDs 1, 2, 3, 4, 5, 6, and 7 are sequenced during initialization. LEDs 1, 3, and 4 are turned ON for approximately four seconds after the hardware initialization has completed, then the application code is initialized. The amount of time the application takes to initialize depends on the size of the database, about 3 seconds without a card database. Each 10,000 cards will add about 3 seconds to the application initialization. When LEDs 1, 2, 3 and 4 flash at the same time, data is being read from or written to flash memory, do not cycle power when in this state. If the sequence stops or repeats, perform the Bulk Erase Configuration Memory procedure. If clearing the memory does not correct the initialization problem, contact technical support.

Running: After initialization is complete, the LEDs have the following meanings: At power up, LEDs 2 through 7 are turned ON then OFF in sequence.

LED	Description
1	Off-line/On-line and battery status
	Off-line = 20% ON, On-line = 80% ON
	Double flash if battery is low
2	Host communication activity
3	Readers (Combined) Reader 1: Clock/Data or D1/D0 Mode = Flashes when Data is Received, Either Input. RS-485 Mode = Flashes when Transmitting Data
4	Input IN1 Status: OFF = Inactive, ON = Active, Flash = Trouble
5	Input IN2 Status: OFF = Inactive, ON = Active, Flash = Trouble
6	Cabinet tamper
7	Not used
YEL	Ethernet Speed: Off = 10Mb/S, ON = 100Mb/S
GRN	Off = no link, ON = good link, Flashing = Ethernet activity

24 Specifications

The interface is for use in low voltage, class 2 circuits only, and it is for use with UL Listed access control power limited power supplies. The installation of this device must comply with all local fire and electrical codes.

- Power Input:
  - PoE power input 12.95W, compliant to IEEE 802.3af or
  - 12 VDC ± 10%, 900 mA maximum

Note: For UL installations, PoE powered devices shall not be used; power for these devices must be provided by a UL294 listed source (12 VDC).

- Power Output (thermally protected)
  - Reader port 1:12 VDC @ 150 mA
  - Reader port 2: use AUX power port
  - AUX power port: used to power reader 2 and/or strike, not to exceed 650 mA
- SRAM Backup Battery: rechargeable battery, with battery life up to 10 years (not field replaceable)
- Host communication: Ethernet: 10Base-T/100Base-TX
- Inputs: 2 supervised, programmable end of line resistors, 1k/2k – ohm, 1% 1/4W watt standard, and dedicated tamper input.
- Relays: 2 outputs, Form-C contacts: 2 A @ 30 VDC
- Reader interface:
  - Reader power: 12 VDC ± 10% or local power supply (12 VDC). (PTC limited 150 mA max)
  - Reader data inputs: Two TTL reader ports
  - RS-485 mode: 9600 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit. Maximum cable length: 4000 feet (1,200m).
  - LED output: TTL compatible, high > 3 V, low < 0.5 V, 5 mA source/sink maximum.
  - Buzzer output: Open collector, 5 VDC open circuit maximum, 10 mA sink maximum.
- Cable Requirements:
  - Power: 1 stranded twisted pair, 18 AWG
  - Ethernet: CAT 5 (minimum)
  - RS-485: 24 AWG, 4,000 feet (1,200m) maximum, stranded twisted pair(s) with an overall shield.
  - Alarm Input: 1 stranded twisted pair per input, 30 ohm maximum loop resistance.
  - Reader data (TTL): 18 AWG stranded, 6 conductors, 500 feet (152.4 m) maximum
  - Reader data (RS-485): 24 AWG, 120-ohm impedance, stranded twisted pair with shield, 4000 feet (1,219 m) maximum
- Environmental:
  - Temperature: Operating: 0° to +70° C (32° to 158° F), Storage: -55° to 85° C (-67° to 185° F)
  - Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimensions: 5.5 x 2.75 x 0.96 in. (140 x 70 x 24 mm)
  - Weight: 3.8 oz. (106.35 g) nominal, board only, 4.7 oz. (133.28 g) with bracket
- Certifications:
  - UL294 Recognized Component
  - FCC Part 15
  - CE marking

- RoHS compliant
- WEEE

Note: These specifications are subject to change without notice.

LNL-2220 INTELLIGENT DUAL READER CONTROLLER

25 Overview of the LNL-2220

This installation guide is intended for use by technicians who will be installing and maintaining the LNL-2220 Intelligent Dual Reader Controller (IDRC).

The IDRC provides a single board solution to control two doors, or a single door in paired mode. It holds the database for the hardware configuration, and card holder database in nonvolatile memory. The event log buffer is stored in battery backed memory.

Each reader port can accommodate a readhead that utilizes wiegand, magnetic stripe, or 2-wire RS-485 electrical signaling standards, one or two wire LED controls, and buzzer control (one wire LED mode only). Four form-c relay outputs may be used for strike control or alarm signaling. The relay contacts are rated at 5A @ 30 VDC, dry contact configuration. Eight supervised inputs are provided for monitoring the door contacts, exit push buttons and alarm contacts. Inputs can be configured to meet Grade A Supervision requirements. The LNL-2220 requires 12-24 VDC for power. It is recommended that the board be mounted 0.25 inch minimum above any conductive surface.

25.1 Interfaces

The IDRC interfaces upstream with the access control software on a host system.

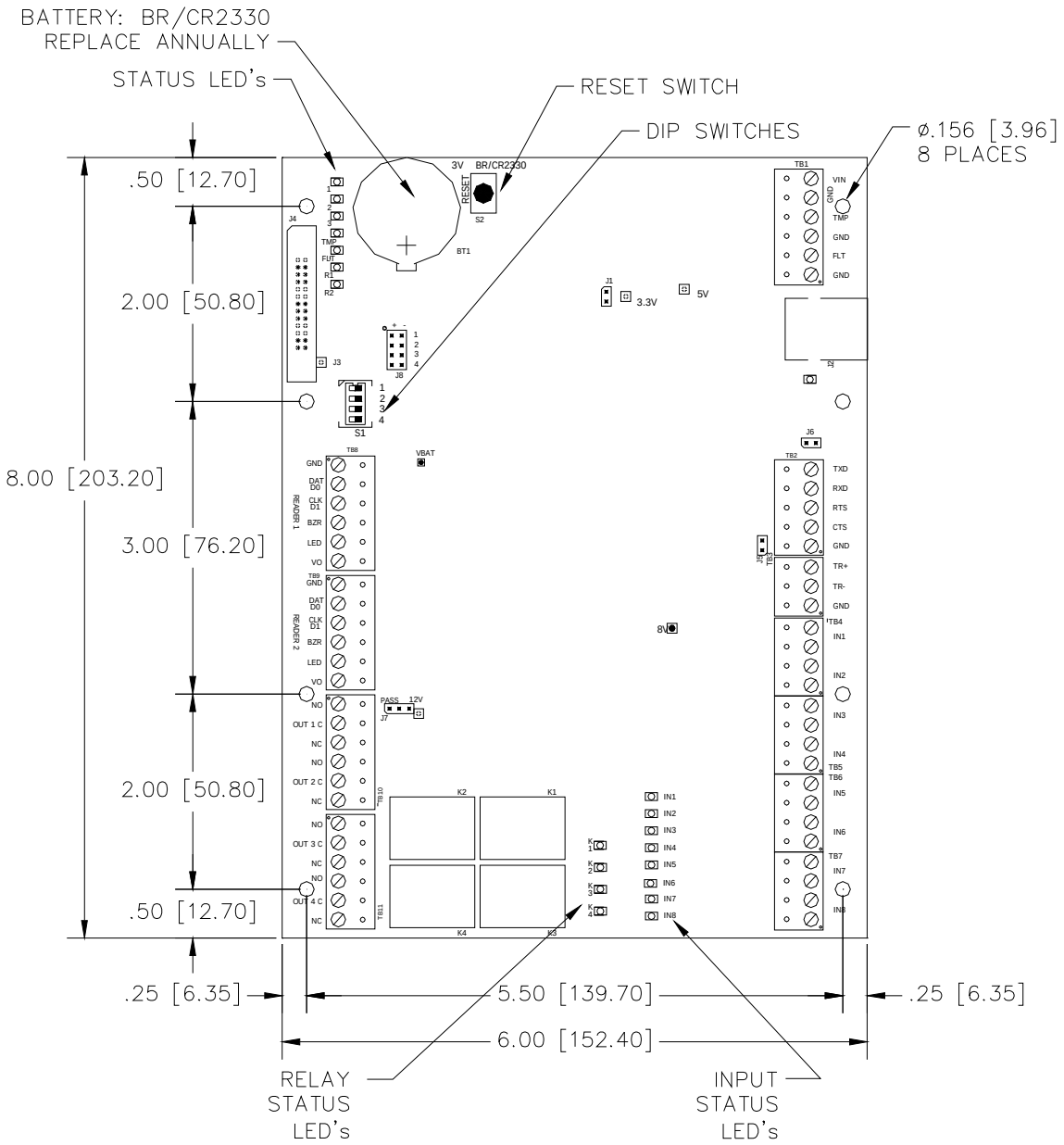
Configuration data and event/status reports are exchanged with the host via port 0, 10BaseT/100BaseTX Ethernet interface or port 1, RS-232 interface. Additional I/O devices are communicated to via the downstream communication port, 2-wire RS-485. It supports 32 downstream devices.

The LNL-2220 has an onboard reader interface device capable of supporting up to two readers. A Bioscrypt reader can be connected directly to the LNL-2220 (this does not count as one of the 32 downstream devices).

25.2 The IDRC Board

The IDRC board contains the following components: one (1) host Ethernet interface, one (1) RS-485 interface, one (1) power-in input, two (2) unsupervised alarm inputs, eight (8) unsupervised/supervised inputs, two (2) reader interfaces, four (4) output relays, four (4) DIP switches, and eight (8) jumpers. It also contains a set of 22 status LEDs and one (1) memory backup (3 volt lithium) battery.

The LNL-2220 Board



25.3 Default Settings

Each board ships with the following default configuration.

- All DIP switches are off.
- IP Addressing: DHCP
- DNS Name: “MAC” followed by the 12-character MAC address.
- Device address: 0. This must match the setting in System Administration for successful IP or serial communications
- Primary host port: Ethernet (serial port is disabled)
- Serial port settings: No flow control
- Data security: None
- Baud Rate: 9600
- Login Name: admin
- Login Password: password (The password is case-sensitive.)

26 Installation

To install the IDRC, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the device for communication.
2. Wire readers, if applicable.
3. Wire the input circuit.
4. Wire the relay circuit.
5. Supply power to the controller and wire the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
6. Remove the plastic safety strip from the memory backup battery.
7. Configure the correct settings using the jumpers and DIP switches.
8. Set the board for the desired initial IP addressing mode.
9. Configure the network and port settings using the embedded web server.

26.1 Wiring and Setup

Refer to the following table for wiring and setup of the LNL-2220.

Connection		
TB1	Power input	VIN: 12 to 24 VDC
		GND
	Cabinet tamper input	TMP
		GND
	Power fault input	FLT
		GND
TB2	Host port 1	TXD (RS-232)
		RXD (RS-232)
		RTS (RS-232)
		CTS (RS-232)
		GND (RS-232)
TB3	Downstream port	TR+ (2-wire RS-485)
		TR- (2-wire RS-485)
		GND(2-wire RS-485)

Connection		
TB4	Input 1	IN 1 Door 1 door contact
	Input 2	IN 2 Door 1 REx
TB5	Input 3	IN 3 Door 1 Aux 1
	Input 4	IN 4 Door 1 Aux 2
TB6	Input 5	IN 5 Door 2 door contact
	Input 6	IN 6 Door 2 REx
TB7	Input 7	IN 7 Door 2 Aux 1
	Input 8	IN 8 Door 2 Aux 2
TB8	Reader 1 (current maximum: 150mA)	GND: Ground
		Data/Data 0/RS-485 TR-
		Clock/Data 1/RS-485 TR+
		BZR: Reader buzzer/LED 2
		LED: Reader LED
		VO: Reader power
TB9	Reader 2 (current maximum: 150mA)	GND: Ground
		Data/Data 0/RS-485 TR-
		Clock/Data 1/RS-485 TR+
		BZR: Reader buzzer/LED 2
		LED: Reader LED
		VO: Reader power
TB10	Out 1 Door 1 strike	NO: Normally open contact
		C: Common
		NC: Normally closed contact
	Out 2 Door 1 Aux	NO: Normally open contact
		C: Common
		NC: Normally closed contact

Connection		
TB11	Out 3 Door 2 strike	NO: Normally open contact
		C: Common
		NC: Normally closed contact
	Out 4 Door 2 Aux	NO: Normally open contact
		C: Common
		NC: Normally closed contact

26.2 Communication Wiring

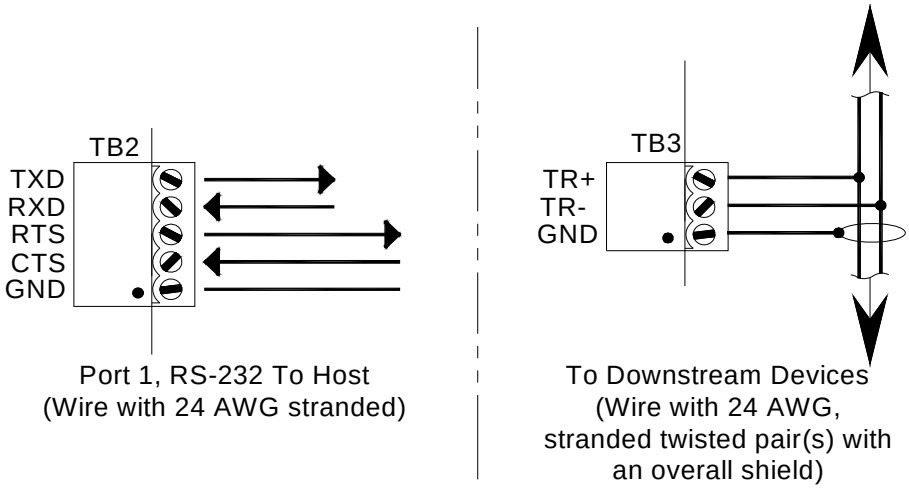
The controller communicates to the host via the onboard 10-BaseT/100Base-TX Ethernet interface (port 0) or RS-232 interface (port 1). The RS-232 interface is for direct one to one connection to a host computer port or via modem, 25 feet maximum.

There are a few options for establishing communication to configure the settings for the first time. For initial configuration prior establishing a LAN connection, a CAT 5 crossover cable can be used to connect directly to a PC. In this scenario, the controller has a static IP address and the web browser-enabled PC is connected directly to the controller using a crossover cable.

The downstream communication port (TB3) is a 2-wire RS-485 interface which can be used to connect additional I/O panels. The interface allows multi-drop communication on a single bus of up to 4000 feet (1200m). Use twisted pairs (minimum 24 AWG) with an overall shield for communication.

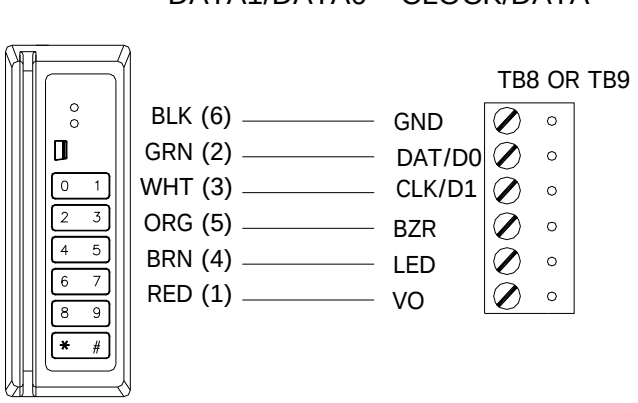
Important: Install the termination jumper ONLY on the panel at each end of the RS-485 bus. Failure to do so will compromise the proper operation of the communication channel!

Communication wiring



26.3 Reader Wiring

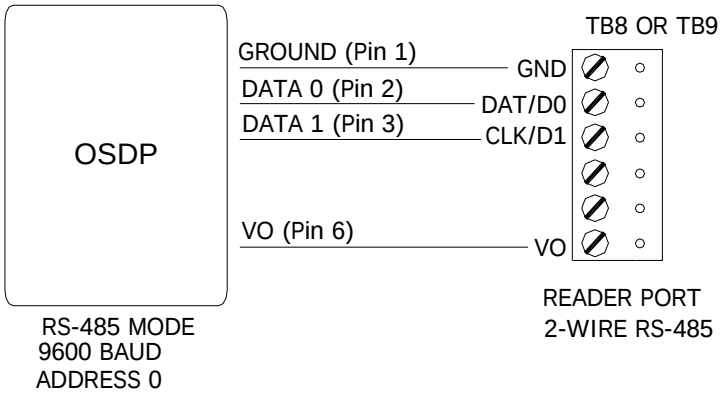
Each reader port supports wiegand, magnetic stripe, and 2-wire RS-485 electrical interfaces. Voltage at the reader port (VO) is passed-through from the input voltage of the controller (TB1-VIN) and is current limited to 150mA for each reader port. Readers that require different voltage or have high current requirements should be powered separately. Refer to the reader manufacturer specifications for cabling requirements. In the 2-wire LED mode the Buzzer output in used to drive the second LED. Reader port configuration is set via the host software.



26.3.1 Open Supervised Device Protocol

Open Supervised Device Protocol (OSDP) uses bi-directional communications between readers and the reader interface, providing constant monitoring of reader health, improved control of reader operation and configuration in real-time, and additional communications capabilities over a single connection, including biometric template download and LCD reader display control.

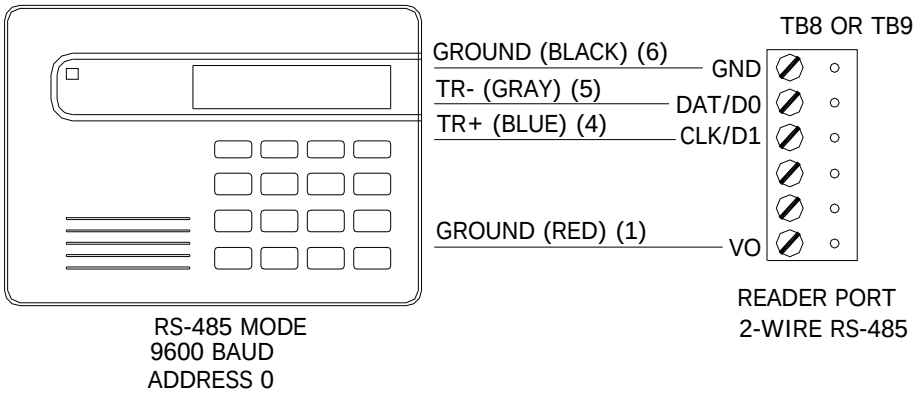
Wiring for OSDP readers



TYPICAL SOFTWARE SETTINGS
Reader Type: IDRC ONBOARD READER1 (OSDP PROTOCOL)
Keypad: EIGHT BIT OUTPUT KEYPAD
LED Mode: 1 or 2-WIRE LED CONTROL

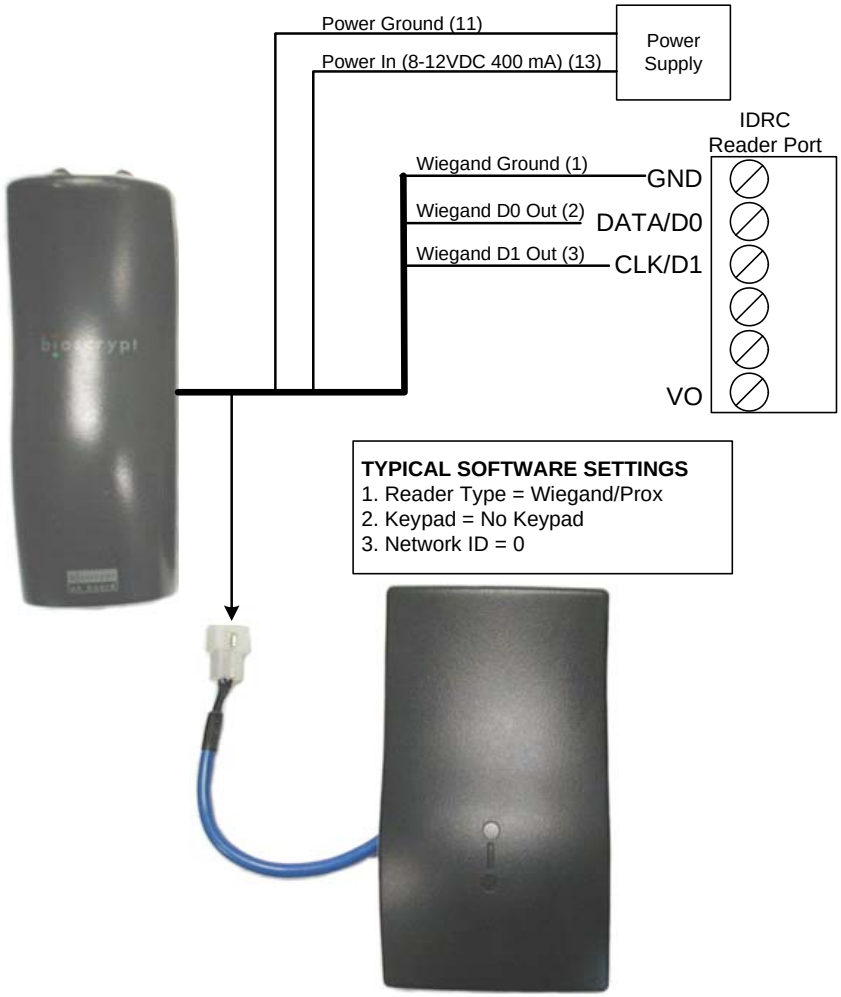
26.3.2 Command Keypad

The command keypad (LNL-CK) can also be connected to the IDRC.



26.3.3 Bioscrypt Readers

The Bioscrypt V-Flex, V-Smart, and V-Station can be connected to the IDRC according to the following diagram.

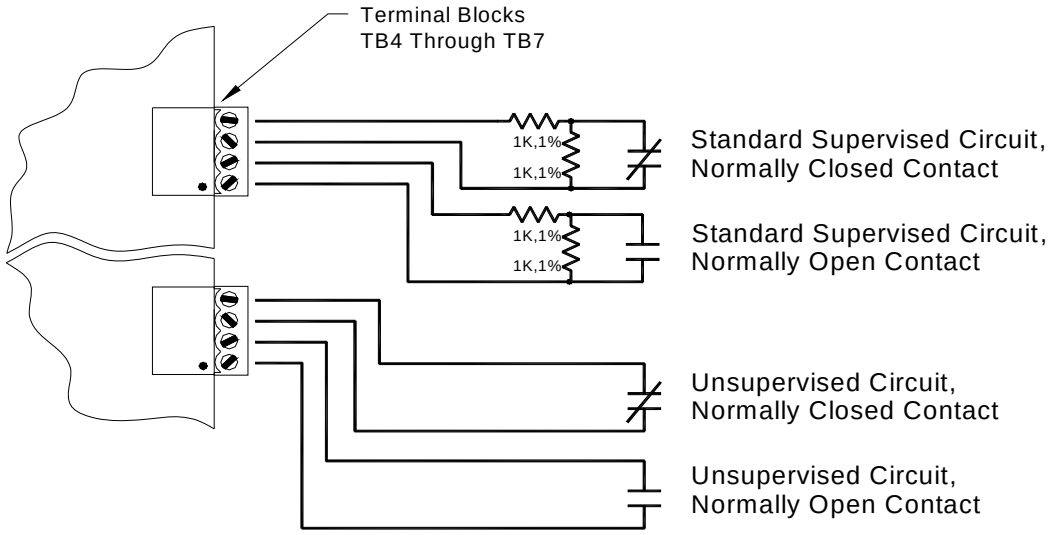


Bioscrypt readers wired to IDRC onboard reader ports 1 and/or 2 should be configured in the Readers form as IDRC Onboard Reader 1/2 (Bioscrypt RS-485) alternate readers associated with any type of primary readers. Bioscrypt readers wired to IDRC Onboard Reader ports 1 and/or 2 should be configured in the VeriAdmin Unit Parameters form for Network ID (0) only.

26.4 Input Circuit Wiring

Typically, these inputs are used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When unsupervised, reporting consists of only the open or closed states. When configured as supervised, the input circuit will report not only open and closed, but also open circuit, shorted, grounded, and foreign voltage. This implementation exceeds the UL294 Requirement for Grade A Supervision.

A supervised input circuit requires two resistors be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1K Ohm, 1% resistors and should be located as close to the sensor as possible. Custom EOL resistances may be configured via the host software.



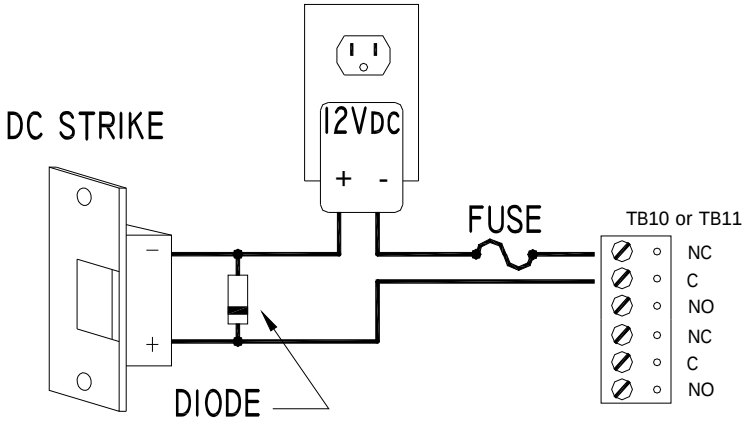
Wire with 22 AWG stranded twisted pair.

26.5 Relay Circuit Wiring

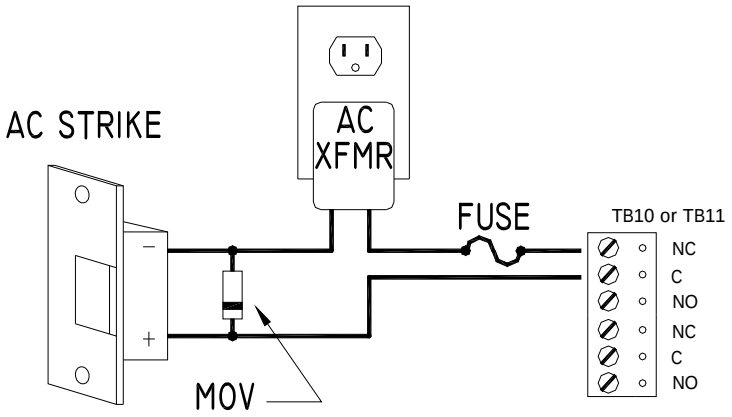
Four relays are provided for controlling door lock mechanisms or alarm signaling. The relay contacts are rated at 5A @ 30 VDC, dry contact configuration. Each relay has a Common pole (C), a Normally Open pole (NO) and a Normally Closed pole (NC). When you are controlling the delivery of power to the door strike, the Normally Open and Common poles are used. When you are momentarily removing power to unlock the door, as with a mag lock, the Normally Closed and Common poles are used. Check with local building codes for proper egress door installation.

Door lock mechanisms can generate feedback to the relay circuit that can cause damage and premature failure of the relay. For this reason, it is recommended that either a diode or MOV (metal oxide varistor) be used to protect the relay.

Wire should be of sufficient gauge to avoid voltage loss.



- **Diode Selection:** Diode current rating: 1x strike current. Diode breakdown voltage 4x strike voltage. For 12 VDC or 24 VDC strike, diode 1N4002 (100V/1A) typical.



- **MOV Selection:** Clamp voltage: 1.5x VAC RMS. For 24 VAC strike, Panasonic ERZC07DK470 typical.

26.5.1 Power and Alarm Inputs

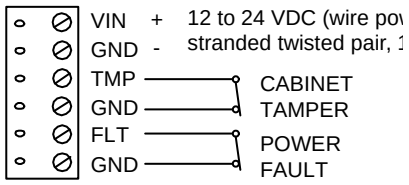
The LNL-2220 requires 12-24 VDC power. Locate power source as close to the unit as possible. Connect power with minimum of 18 AWG wire.

Note: Connect the GND signal to earth ground in ONE LOCATION within the system! Multiple earth ground connections may cause ground loop problems and is not advised.

Observe POLARITY on 12-24 VDC input!

There are two dedicated inputs for cabinet tamper and UPS fault monitoring. Normal (safe) condition is a closed contact. If these inputs are not used, install a jumper wire.

Wiring for power, power fault, and cabinet tampering



26.6 Memory Backup Battery

Remove the factory-installed plastic safety strip from the memory backup battery. This plastic strip prevents the battery from being effectively seated. The battery will not function properly until the plastic strip is removed. When the battery is enabled, event memory is protected.

26.7 Configuration

The IDRC board is configured through jumpers, DIP switches, and web browser.

26.7.1 Setting Dip Switches

Set DIP switches as required. The following chart describes the use of each DIP switch.

Some switch settings behave differently at power up than they do after initialization. Keep this in mind when changing settings.

Switch	Selection:
SW1	When SW1 is on, use the default login user name and password. (This can be changed without resetting the board.) User name: `admin` Password: `password`
SW2	During power up, when SW2 is on (and SW1 is off) for the first 10 seconds, the default static IP address is 192.168.0.251, and the primary path is configured for IP Server. The serial port is disabled, since the IDRC can only communicate via the LAN or the serial port (but not both).
SW3	By default this switch is off and SSL is enabled. Turn SW3 ON to disable SSL settings.
SW4	Not used.

Resetting the Controller

The controller can be reset to its factory default state. Performing this procedure will erase any configured IP address, user names, and passwords as well.

To clear the flash and ram on the board using DIP switches:

1. Set SW1 and SW2 to ON.

2. Power up the board or press the reset button.
3. While LEDs D1, D2 and D3, D4 light up as alternating pairs (duration of about 10 seconds), drop either of the switches (SW1 or SW2) to off.
4. While the memory is being cleared, LED D2 blinks slowly. Do nothing to the board while this is occurring. When it is completed, D1 flashes briefly, and all the input lights will flash. The board will then reset itself.
5. Turn SW2 ON and log into board using default IP address 192.168.0.251.
6. Once at the login screen, turn off SW2 and turn on SW1 to enable the default login.

After power up or board reset, the board will not respond to web communications request for about 15 seconds. Please allow this much time.

To verify that the board has been reset, you may check that the users have been removed and that the network setting is configured as DHCP.

26.7.2 Installing Jumpers

The following chart describes each jumper.

Jumpers	Set at	Description
J1	n/a	Factory use only
J2	n/a	10base-T/100base-Tx Ethernet Connection (Port 0)
J3	n/a	Factory use only
J4	n/a	Factory use only
J5	off	Port 2 RS-485 EOL terminator is off.
	ON	Port 2 RS-485 terminator is ON.
J6	n/a	Factory use only
J7	Reader power select * See Note 1 *	
	12V	12 VDC at reader ports
	PASS	VIN pass through to reader ports
J8-1	n/a	Remote status LED #1 ** See Note 2 **
J8-2	n/a	Remote status LED #2 ** See Note 2 **
J8-3	n/a	Remote status LED #3 ** See Note 2 **
J8-4	n/a	Remote status LED #4 ** See Note 2 **

* Note 1: The input power (VIN) must be 20 VDC minimum if the 12 VDC selection is to be used.

** Note 2: Observe POLARITY connection to LED. External current limiting is not required.

26.8 Initial IP Addressing Mode

Set the board for the desired initial IP addressing mode. The board can be initially configured using a fixed static IP address or an IP address automatically assigned by a DHCP server.

- **Automatic Address Assignment** By default, the IP address will be assigned by a DHCP server. The DNS name is “MAC” followed by the characters of the unit’s MAC address.

- **Fixed Static IP Address** In order to use a fixed static IP address, Power up the board with DIP switch 2 ON and DIP switch 1 off. This default address cannot be changed. If this is chosen, the default static IP address is 192.168.0.251.

To communicate with the board using this address, the computer must also be on the same subnet. Usually, this requires changing the computer’s network interface card settings.

Note: Ensure that DIP switch 1 is off and DIP switch 2 is ON before rebooting to keep board in default static IP address mode.

26.9 Embedded Web Server

Instead of using DIP switches or jumpers to define communication and addressing, the LNL-2220 can be configured through the web interface.

26.9.1 Logging in for the First Time

There is one pre-defined user always available by turning DIP switch SW1 ON after power up. When logging on for the first time, since no other users are defined yet, the default user name and password are required for configuring this board.

After configuring ports and users, be sure to turn SW1 off to enable the settings you’ve configured.

Note: All boards have a static certificate that reflects a static IP address. This causes a warning to appear initially when trying to log in that states a problem with this website's security certificate. Although it is not recommended, proceed to the website.

26.9.2 Configuration via Web Page

The Configuration Web Page can be launched from within System Administration (only if an IP address or host name is specified) or by using a browser to access the programmed IP address. Depending on your proxy settings, you may have to allow this web page. (For more information, consult your browser’s online help or system administrator for assistance.)

1. In System Administration in the Access Panels folder, click [Configuration Web Page]. This page will launch in a browser. (You may also access this page by going to the device IP address from within the browser.)

2. Click the link to go to the login page. Log in using your user name and password. If DIP switch 1 is ON, then the default user name and password is used (`admin`, `password`). If DIP switch 1 is off, use the login that was programmed in the device. Click [Login].
3. The Home page indicates the type of device and has a Notes field. You may type in a description here. Click [Save Notes].
4. To configure network settings, click [Network].
   - If you are using DHCP, specify a host name. By default, the host name consists of "MAC" followed by the numbers of the device MAC address. With DHCP, IP settings will be configured automatically.
   - For a static IP address, specify the IP address, subnet mask, and default gateway.
   - Click [Accept].
5. To configure the host, click [Host Comm].
   a. Specify the controller's communication address.
   b. Configure the following under Primary Host Port:
      – **Connection Type**: Choose IP Server, Serial-RS232, or Serial-modem. Currently, the IP Client connection type is not supported. Serial-RS485 and Serial-Cobox are only available for use with the LNL-3300.
      – **Data Security**: The controller is capable of Password/AES encryption.
      – **Port Number** (default 3001) Must match setting in the access control software.

      When using an IP Server connection, the controller may be configured to allow all IP addresses or only authorized IP addresses.
   c. Click [Accept].
6. To view information, click [Device Info].
   You may view the time and product ID, as well as properties that have been configured, such as firmware version, serial number, device name, DIP switches, etc.
7. For users configuration, click [Users].
   User accounts may be created, edited or deleted. Each user account has an associated user name and password, as well as a level and notes.
   a. One of three different levels may be assigned to users.
      – Level 1 — Full control
      – Levels 2 and 3 have the following permissions:

Access	View allowed	Edit allowed
Home page	Level 2: Yes (cannot edit notes) Level 3: Yes (cannot edit notes)	Level 2: No Level 3: No
Network page	Level 2: Yes Level 3: No	Level 2: No Level 3: No
Host Port page	Level 2: Yes Level 3: No	Level 2: No Level 3: No
Device Info page	Level 2: Yes Level 3: Yes	n/a
Users page	Level 2: No Level 3: No	Level 2: No Level 3: No

Access	View allowed	Edit allowed
Restore/Default page	Level 2: No Level 3: No	Level 2: No Level 3: No
Apply Setting page	Level 2: No Level 3: No	Level 2: No Level 3: No

For pages that cannot be viewed, the message is displayed when users attempt to access the page: “This page is unavailable due to one of the following reasons: your user level is not authorized to view this page, or another level 1 user is logged in at this time.”

b. Select the password strength.

- Low - The minimum password length must be six characters. None of the password strength criteria will be enforced.
- Medium - The minimum password length must be six characters. Two of the password strength criteria must be met.
- High - The minimum password length is eight characters. Three of the password strength criteria must be met. Additionally, strong passwords are checked to make sure that they are not based on the user name.

Password strength criteria:

- Uppercase alphabet characters
- Lowercase alphabet characters
- Arabic numerals (0-9)
- Non alphanumeric characters ` ! ? $ ^ * ( ) _ - + = { [}] : ; @ ~ # | < , > . ? /

  Characters " , \, &, = and % are invalid characters and cannot be used for passwords.

c. Specify the Session Timer (5 to 60 minutes). Click [Save].

d. You may disable the web server by selecting the check box. When this option is selected and SW1 is off, all ports except for the host communication port will be disabled. The configuration web page cannot be used to access the device.

e. Select the **Enable door forced open filter** check box if you do not want a forced open alarm if the door is opened within three seconds of it being closed.

8. For configuration of auto-save, click [Auto-Save].

   a. On this page, you may restore the last save or clear all the settings.

   b. Choose to disable or enable Auto-Save. If Auto-Save is enabled, volatile memory is written to flash. The frequency of this action is specified in the timer (30 seconds to 30 minutes). Click [Save Settings].

9. You may click [Restore/Default] if you need to reload the factory settings or the current operating settings.

10. When you have completed configuring the device, click [Apply Settings], [Apply Settings, Reboot], and then [Log Out].

27 Maintenance

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

27.1 Verification

Power-up: All LEDs OFF.

Initialization: LEDs are sequenced during initialization.

The following chart describes the purpose of each LED on the IDRC board.

LED	Description
1	Off-line/On-line and battery status
	Off-line = 20% ON, On-line = 80% ON
	Double flash if battery is low
2	Primary host communication activity (serial port 1)
3	Internal downstream communication activity
TMP	External downstream communication activity
FLT	Undefined
R1	Reader 1: Clock/Data or D1/D0 mode = flashes when data is received, either input. RS-485 mode = flashes when transmitting data
R2	Reader 2: Clock/Data or D1/D0 mode = flashes when data is received, either input. RS-485 mode = flashes when transmitting data
D16	Flashes with host communication (Ethernet port 0)
YEL	Ethernet Speed: OFF = 10Mb/S, ON = 100Mb/S
GRN	Off = no link, ON = good link, Flashing = Ethernet activity
IN1	Input IN1 Status: Off = Inactive, ON = Active, Flash = Trouble
IN2	Input IN2 Status: Off = Inactive, ON = Active, Flash = Trouble
IN3	Input IN3 Status: Off = Inactive, ON = Active, Flash = Trouble
IN4	Input IN4 Status: Off = Inactive, ON = Active, Flash = Trouble
IN5	Input IN5 Status: Off = Inactive, ON = Active, Flash = Trouble
IN6	Input IN6 Status: Off = Inactive, ON = Active, Flash = Trouble
IN7	Input IN7 Status: Off = Inactive, ON = Active, Flash = Trouble

LED	Description
IN8	Input IN8 Status: Off = Inactive, ON = Active, Flash = Trouble
K1	Reader 1 Strike
K2	Reader 1 Aux output 1
K3‘	Reader 2 Strike
K4	Reader 2 Aux output 1

27.2 Replace Memory Backup Battery

The event log buffer and the real time clock are backed up by a 3V lithium battery. Without power being applied to the LNL-2220, the battery will retain events and transactions for 3 months.

This battery should be replaced annually to insure that proper backup functionally is maintained. Remove the insulator from the battery holder after installation. Battery type: Rayovac BR2325 or Wuhan Lixing CR2330.

28 Specifications

The IDRC is for use with UL Listed access control power limited power supplies.

- Primary Power: 12 to 24 VDC ±10%, 500mA maximum (plus reader current)
  - 12 VDC @ 250mA (plus reader current) nominal
  - 24 VDC @ 150mA (plus reader current) nominal
- Memory and Clock Backup: 3V Lithium, Rayovac BR2325 or Wuhan Lixing CR2330
- Host communication: Ethernet: 10BaseT/100Base-TX, and RS-232 9600 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit.
- Downstream communication: 2-wire RS-485, 2400-38400 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit.
- Inputs:
  - 2 unsupervised, dedicated for tamper and UPS fault monitoring
  - 8 unsupervised/supervised, standard EOL: 1k/1k ohm. Four custom EOL's are available (host software dependent).
- Relays: Four, Form-C, 5A @ 30 VDC, resistive
- Reader interface:
  - Reader power (jumper selectable): 12 VDC ±10% regulated, current limited to 150mA for each reader or 12 to 24 VDC ±10% (input voltage passed through) current limited to 150mA for each reader.
  - Data inputs: TTL compatible inputs, mag stripe and wiegand standards supported
  - RS-485 mode: 9600 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit.
  - LED output: TTL levels, high > 3V, low < 0.5 V, 5mA source/sink max.
  - Buzzer output: TTL levels, high > 3V, low < 0.5 V, low=active, 5mA source/sink max.
- Cable Requirements:
  - Power: 1 stranded twisted pair, 18 AWG
  - Ethernet: CAT 5
  - RS-485: 24 AWG stranded twisted pair(s) with an overall shield, 4000 feet (1219 m) maximum
  - RS-232: 24 AWG stranded, 25 feet (7.6 m) maximum
  - Alarm Input: stranded twisted pair, 30 ohms maximum, typically 22 AWG @ 1000 feet (300 m)
- Environmental:
  - Temperature: Operating: 0° to +70° C (32° to 158° F), Storage: -55° to 85° C (-67° to 185° F)
  - Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimensions: 8 x 6 x 1 in. (203.2 x 152.4 x 25 mm)
  - Weight: 9 oz. (255 g) nominal, board only
- Certifications:
  - UL294 & UL1076 Listed
  - ULC Listed
  - FCC Part 15
  - C-Tick
  - FIPS 197 Certificate #766
  - CE marking
  - RoHS compliant

- WEEE

Note: These specifications are subject to change without notice.

LNL-3300 INTELLIGENT SYSTEM CONTROLLER

29 Overview of the LNL-3300

This installation guide is intended for use by technicians who will be installing and maintaining the Intelligent System Controller.

The LNL-3300 provides the real time processing for the I/O interfaces connected to it. The database for the subsystem configuration and card holders are stored in flash memory. The event log buffer is stored in battery-backed memory. Configuration data and event/status reports are communicated to the host via onboard 10BaseT/100BaseTX Ethernet port or port 1.

29.1 Interfaces

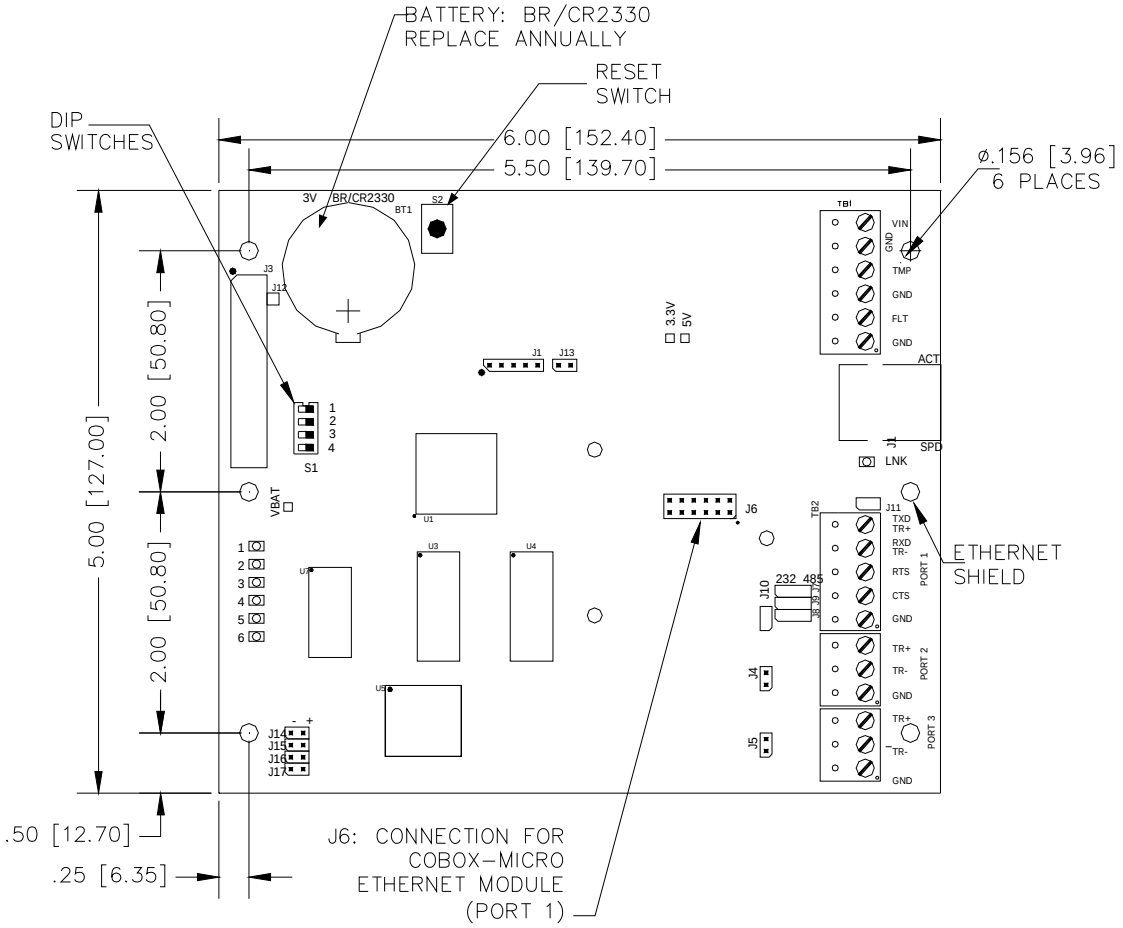
The ISC interfaces upstream with the access control software on a host system. This communication occurs through an onboard 10BaseT/100BaseTX Ethernet port or port 1. Port 1 may be set up as RS-232, 2-wire RS-485 or an optional 10BaseT/100BaseTX using a Lantronix CoBox-Micro interface daughter board. Dual path communication from the host to the controller may be set up via RS-232, RS-485, Ethernet, dial-up, etc.

Downstream devices are connected via ports 2 and 3 using 2-wire RS-485.

29.2 The ISC Board

The ISC board contains the following components: two (2) unsupervised alarm inputs, one (1) host Ethernet interface, one (1) RS-232 or RS-485 interface, two (2) RS-485 interfaces (2-wire), one (1) power-in input, four (4) DIP switches, and sixteen (16) jumpers. It also contains a set of six (6) status LEDs and one (1) memory backup (3 volt lithium) battery.

The ISC Board



29.3 Default Settings

Each board ships with the following default configuration.

- All DIP switches are off.
- IP Addressing: DHCP
- DNS Name: “MAC” followed by the 12-character MAC address.
- Device address: 0. This is the RS-485 address, but also must match setting in System Administration for successful IP communications
- Serial port settings: No flow control
- Data security: None
- Baud Rate: 9600
- Login Name: admin
- Login Password: password (The password is case-sensitive.)

30 Installation

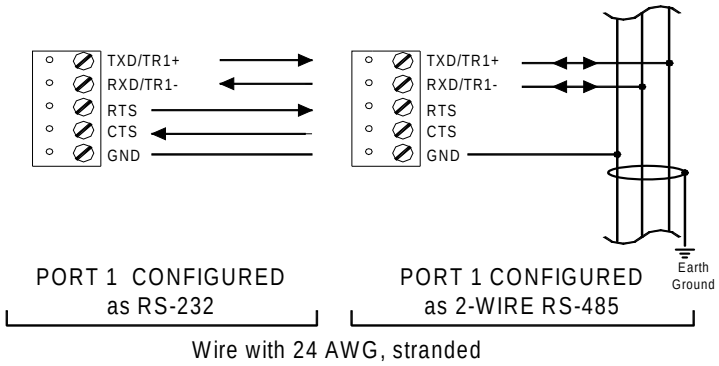
To install the ISC, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the device for communication.
2. Supply power to the controller and wire the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
3. Remove the plastic safety strip from the memory backup battery.
4. Configure the correct settings using the jumpers and DIP switches.
5. Set the board for the desired initial IP addressing mode.
6. Configure the network and port settings using the embedded web server.

30.1 Communication Wiring

The controller communicates to the host via: onboard Ethernet 10Base-T/100Base100-TX port or on port 1. Dual path communication from the host to the LNL-3300 is supported. Port 1 may be configured as RS-232, 2-wire RS-485 or optional Lantronix Ethernet 10baseT/100Base-TX CoBox-Micro interface. RS-232 interface is for direct one to one connection to a host computer port or a modem, 25 feet maximum.

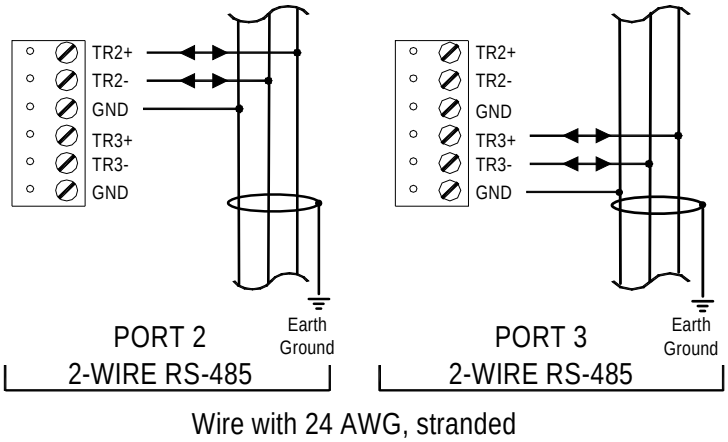
Wiring port 1



There are a few options for establishing communication to configure the settings for the first time. For initial configuration prior establishing a LAN connection, a CAT 5 crossover cable can be used to connect directly to a PC. In this scenario, the controller has a static IP address and the web browser-enabled PC is connected directly to the controller using a crossover cable.

Ports 2 and 3 utilize 2-wire RS-485 interface only. The interface allows multi-drop communication on a single bus of up to 4000 feet (1,200 m). Use twisted pair (minimum 24 AWG) with shield for the communication with 120 ohm impedance. Install termination jumpers only at the end of line unit.

Wiring ports 2 and 3

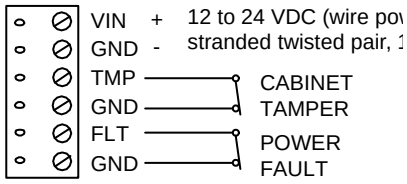


30.2 Power and Alarm Inputs

The LNL-3300 accepts 12 to 24 VDC for power. Locate power source as close to the unit as possible. Connect power with minimum of 18 AWG wires. Inputs TMP and FLT are used for monitoring cabinet tamper and power failure with normally closed contacts. These two inputs are for contact closure monitoring only, and do not use EOL resistor(s). If these inputs are not used, install a short piece of wire at the input to indicate safe condition.

Observe POLARITY on VIN!

Wiring for power, power fault, and cabinet tampering



30.3 Memory Backup Battery

Remove the factory-installed plastic safety strip from the memory backup battery. This plastic strip prevents the battery from being effectively seated. The battery will not function properly until the plastic strip is removed. When the battery is enabled, event memory is protected.

30.4 Configuration

The controller is configured through jumpers, DIP switches, and web browser.

30.4.1 Setting DIP Switches

Set DIP switches as required. The following chart describes the use of each DIP switch.

Some switch settings behave differently at power up than they do after initialization. Keep this in mind when changing settings.

Switch	Selection:
SW1	When SW1 is on, use the default login user name and password. (This can be changed without resetting the board.) User name: `admin` Password: `password`
SW2	During power up, when SW2 is on (and SW1 is off) for the first 10 seconds, the default configuration is as follows: Static IP address: 192.168.0.251 Primary path: configured for IP Server Secondary path: configured for RS-232 at 38400 bps No handshake, no encryption.
SW3	By default this switch is off and SSL is enabled. Turn SW3 ON to disable SSL settings.
SW4	Not used.

Resetting the Controller

The controller can be reset to its factory default state. Performing this procedure will erase any configured IP address, user names, and passwords as well.

To clear the flash and ram on the board using DIP switches:

1. Set SW1 and SW2 to ON.
2. Power up the board or press the reset button.
3. While LEDs D1, D2 and D3, D4 light up as alternating pairs (duration of about 10 seconds), drop either of the switches (SW1 or SW2) to off.
4. While the memory is being cleared, LED D2 blinks slowly. Do nothing to the board while this is occurring. When it is completed, D1 flashes briefly, and all the input lights will flash. The board will then reset itself.
5. Turn SW2 ON and log into board using default IP address 192.168.0.251.
6. Once at the login screen, turn off SW2 and turn on SW1 to enable the default login.

After power up or board reset, the board will not respond to web communications request for about 15 seconds. Please allow this much time.

To verify that the board has been reset, you may check that the users have been removed and that the network setting is configured as DHCP.

30.4.2 Installing Jumpers

The following chart describes each jumper.

Jumpers	Set at	Description
J2	n/a	Factory use only

Jumpers	Set at	Description
J3	n/a	Factory use only
J4	off	Port 2 RS-485 EOL terminator is off.
	ON	Port 2 RS-485 terminator is ON.
J5	off	Port 3 RS-485 EOL terminator is off.
	ON	Port 3 RS-485 terminator is ON.
J6		Connector for Lantronix CoBox-micro connection - port 1
J7, J8, J9	232	Port 1 is RS-232
	485	Port 1 is RS-485
J10	off	Port 1 RS-485 EOL terminator is off.
	ON	Port 1 RS-485 terminator is ON.
J11	n/a	Factory use only
J12	n/a	Factory use only
J13	n/a	Factory use only
J14	n/a	Remote status LED #1 (see note below)
J15	n/a	Remote status LED #2 (see note below)
J16	n/a	Remote status LED #3 (see note below)
J17	n/a	Remote status LED #4 (see note below)

Note: Observe POLARITY connection to LED. External current limiting is not required.

30.5 Initial IP Addressing Mode

Set the board for the desired initial IP addressing mode. The board can be initially configured using a fixed static IP address or an IP address automatically assigned by a DHCP server.

- **Automatic Address Assignment** By default, the IP address will be assigned by a DHCP server. The DNS name is “MAC” followed by the characters of the unit’s MAC address.

- **Fixed Static IP Address** In order to use a fixed static IP address, Power up the board with DIP switch 2 ON and DIP switch 1 off. This default address cannot be changed. If this is chosen, the default static IP address is 192.168.0.251.

To communicate with the board using this address, the computer must also be on the same subnet. Usually, this requires changing the computer’s network interface card settings.

Note: Ensure that DIP switch 1 is off and DIP switch 2 is ON before rebooting to keep board in default static IP address mode.

30.6 Embedded Web Server

Instead of using DIP switches or jumpers to define communication and addressing, the LNL-3300 can be configured through the web interface.

30.6.1 Logging in for the First Time

There is one pre-defined user always available by turning DIP switch SW1 ON after power up. When logging on for the first time, since no other users are defined yet, the default user name and password are required for configuring this board.

After configuring ports and users, be sure to turn SW1 off to enable the settings you've configured.

Note: All boards have a static certificate that reflects a static IP address. This causes a warning to appear initially when trying to log in that states a problem with this website's security certificate. Although it is not recommended, proceed to the website.

30.6.2 Configuration via Web Page

The Configuration Web Page can be launched from within System Administration (only if an IP address or host name is specified) or by using a browser to access the programmed IP address. Depending on your proxy settings, you may have to allow this web page. (For more information, consult your browser's online help or system administrator for assistance.)

1. In System Administration in the Access Panels folder, click [Configuration Web Page]. This page will launch in a browser. (You may also access this page by going to the device IP address from within the browser.)
2. Click the link to go to the login page. Log in using your user name and password. If DIP switch 1 is ON, then the default user name and password is used (`admin`, `password`). If DIP switch 1 is off, use the login that was programmed in the device. Click [Login].
3. The Home page indicates the type of device and has a Notes field. You may type in a description here. Click [Save Notes].
4. To configure network settings, click [Network].
   - If you are using DHCP, specify a host name. By default, the host name consists of "MAC" followed by the numbers of the device MAC address. With DHCP, IP settings will be configured automatically.
   - For a static IP address, specify the IP address, subnet mask, and default gateway.
   - Click [Accept].
5. To configure the host, click [Host Comm].
   a. Specify the controller's communication address. This is the address used for RS-485, also must match the setting in the access control software, even for IP communications.

b. Configure the following:

- **Connection Type**: Choose IP Server, Serial-RS232, or Serial-modem, Serial-RS485 (LNL-3300 only) and Serial-Cobox (LNL-3300 only). Currently the IP Client connection type is not supported.
- **Data Security**: The controller is capable of Password/AES encryption.
- **Port Number** (default 3001) Must match setting in the access control software.

When using an IP Server connection, the controller may be configured to allow all IP addresses or only authorized IP addresses.

c. Configure an alternate host port if needed. Dual path communication is available on the LNL-3300 only. If you opt NOT to use dual path communication, set this to **Disabled**.

d. Click [Accept].

6. To view information, click [Device Info].
You may view the time and product ID, as well as properties that have been configured, such as firmware version, serial number, device name, DIP switches, etc.

7. For users configuration, click [Users].
User accounts may be created, edited or deleted. Each user account has an associated user name and password, as well as a level and notes.

a. One of three different levels may be assigned to users.

- Level 1 — Full control
- Levels 2 and 3 have the following permissions:

Access	View allowed	Edit allowed
Home page	Level 2: Yes (cannot edit notes) Level 3: Yes (cannot edit notes)	Level 2: No Level 3: No
Network page	Level 2: Yes Level 3: No	Level 2: No Level 3: No
Host Port page	Level 2: Yes Level 3: No	Level 2: No Level 3: No
Device Info page	Level 2: Yes Level 3: Yes	n/a
Users page	Level 2: No Level 3: No	Level 2: No Level 3: No
Restore/Default page	Level 2: No Level 3: No	Level 2: No Level 3: No
Apply Setting page	Level 2: No Level 3: No	Level 2: No Level 3: No

For pages that cannot be viewed, the message is displayed when users attempt to access the page: “This page is unavailable due to one of the following reasons: your user level is not authorized to view this page, or another level 1 user is logged in at this time.”

b. Select the password strength.

- Low - The minimum password length must be six characters. None of the password strength criteria will be enforced.

- Medium - The minimum password length must be six characters. Two of the password strength criteria must be met.
- High - The minimum password length is eight characters. Three of the password strength criteria must be met. Additionally, strong passwords are checked to make sure that they are not based on the user name.

Password strength criteria:

- Uppercase alphabet characters
- Lowercase alphabet characters
- Arabic numerals (0-9)
- Non alphanumeric characters ` ! ? $ ^ * ( ) _ - + = { [}] : ; @ ~ # | < , > . ? /

  Characters " , \, &, = and % are invalid characters and cannot be used for passwords.

c. Specify the Session Timer (5 to 60 minutes). Click [Save].

d. You may disable the web server by selecting the check box. When this option is selected and SW1 is off, all ports except for the host communication port will be disabled. The configuration web page cannot be used to access the device.

e. Select the **Enable door forced open filter** check box if you do not want a forced open alarm if the door is opened within three seconds of it being closed.

8. For configuration of auto-save, click [Auto-Save].
   a. On this page, you may restore the last save or clear all the settings.
   b. Choose to disable or enable Auto-Save. If Auto-Save is enabled, volatile memory is written to flash. The frequency of this action is specified in the timer (30 seconds to 30 minutes). Click [Save Settings].
9. You may click [Restore/Default] if you need to reload the factory settings or the current operating settings.
10. When you have completed configuring the device, click [Apply Settings], [Apply Settings, Reboot], and then [Log Out]. If the IP address has changed, you will need to log in with the new IP address to continue.

31 Maintenance

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

31.1 Verification

The ISC board contains six status LEDs that can be used to verify correct installation after power up.

The following chart describes the purpose of each LED on the ISC board.

Initialization:

LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	Purpose
ON	off	off	off	off	off	Basic processor initialization
ON	ON	off	off	off	off	Internal SRAM test
ON	off	ON	off	off	off	External flash test
ON	ON	ON	off	off	off	External SDRAM, first chip test
ON	off	off	ON	off	off	External SDRAM, second chip test
ON	ON	off	ON	off	off	External SRAM test
ON	off	ON	ON	off	off	External EEPROM test
ON	ON	ON	ON	off	off	External RTC test
ON	off	off	off	ON	off	Backup battery ABD reset circuit test
ON	ON	off	off	ON	off	UART test
ON	off	ON	off	ON	off	Ethernet interface, MII

Run time:

LED	Description
1	Off-line/on-line and battery status
	Off-line = 20% ON. On-line = 80% ON
	Double flash if battery is low
2	Primary host communication activity (Ethernet or port 1)
3	Port 2 communication activity
4	Port 3 communication activity
5	ON = writing to flash memory. *Do not remove power when ON*.
6	TBD

Run time:

LED	Description
SPD	Onboard Ethernet speed: off = 10 Mb/S, ON = 100 Mb/S
ACT	Off = no onboard Ethernet activity, ON = Ethernet activity (yellow LED)
LNK	Off = no link, ON = good link (green LED)

31.2 Replace Memory Backup Battery

The ISC contains a memory backup battery that is used to back up event and transaction data in the event of a power failure.

A 3V lithium ion battery (Rayovac BR2325 or Wuhan Lixing CR2330) is used for the memory backup. This battery should be replaced annually.

Caution: There is a danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with the manufacturer's instructions.

32 Specifications

** The ISC is for use with UL Listed access control power limited power supplies.

- Primary Power: 12 to 24 VDC ±10%, 300 mA maximum
  - 12 VDC @ 240mA (325mA with CoBox-Micro) nominal
  - 24 VDC @ 135mA (175mA with CoBox-Micro) nominal
- Memory and Clock Backup: 3V Lithium, Rayovac BR2325 or Wuhan Lixing CR2330
- Communication Ports:
  - Port 1: RS-232 or 2-wire RS-485: 9,600 to 115,200 bps, async
  - Ports 2 and 3: 2-wire RS-485: 2,400 to 38,400 bps, async
- Inputs: two non-supervised, dedicated for cabinet tamper and power fault monitoring
- Cable Requirements:
  - Power: 1 stranded twisted pair, 18 AWG
  - RS-485: 24 AWG stranded twisted pair(s) with shield, 4000 feet (1219 m) maximum, 120 Ohm
  - RS-232: 24 AWG stranded, 25 feet (7.6 m) maximum
  - Ethernet: Cat 5
  - Alarm inputs: stranded twisted pair, 30 ohms maximum
- Environmental:
  - Temperature: Operating: 0° to 70° C (32° to 158° F). Storage: -55° to 85° C (-67° to 185° F)
  - Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimension: 5 in. x 6 in. x 1 in. (127 x 152.4 x 25mm)
  - Weight: 4.1 oz. (115 g) nominal
- Lantronix NIC support: Standoff size - Diameter .125 inch x 7/16 inch long. Richco Plastics part number LMSP-7-01, 3 pieces (Not supplied)
- Certifications:
  - UL294 & UL1076 Listed
  - ULC Listed
  - FCC Part 15
  - C-Tick
  - FIPS 197 Certificate #767
  - CE marking
  - RoHS compliant
  - WEEE

Note: These specifications are subject to change without notice.

ISC COMMUNICATIONS

33 ISC Communication

The following information can be used to configure communication for Lenel controllers unless otherwise stated.

33.1 LAN Connections

For LAN panels, any baud rate set on an ISC (primary path port 1 via DIP switches 6 and 7) will work as long as the baud rate on the Lantronix box is set to match (via the “change speed” command).

The primary path of the LNL-2000 connected to a Lantronix box can have its baud rate set to the highest (115,200) baud rate. The Lantronix box simply needs to have its serial speed at 115,200 as well. In order for 115,200 baud to work reliably on any connection (direct serial, dedicated LAN, or dial-up on a dedicated phone line), a wire from CTS to RTS1/R1+ on the LNL-2000 Port 1 is required.

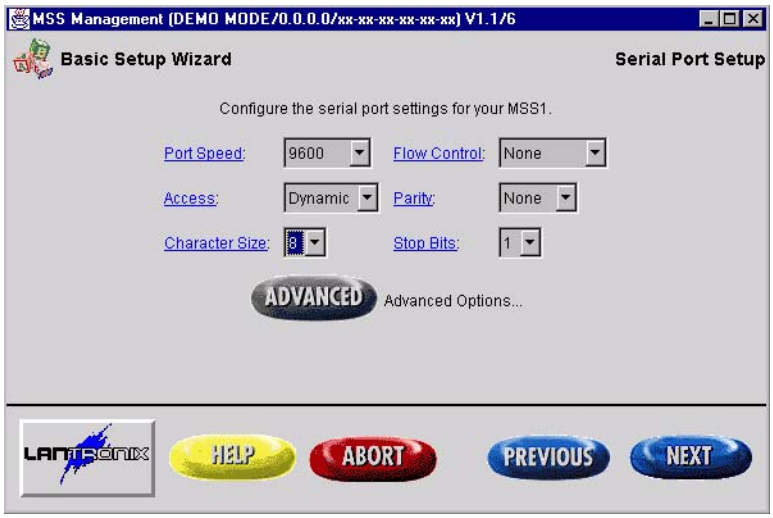
The speed of the secondary path (port 6) on the LNL-2000 is always 38400 baud. This is not configurable at the hardware level. Also, the MSSLITE currently only supports 38400 baud with the LNL-2000, regardless of the port.

For UL Certified installations, these communication devices, if not directly powered and mounted to the controller, must be mounted in their own CTX enclosures for their own unique applications unless otherwise noted. The power for the LAN connection hardware must be provided by the control power supply (LNL-AL400ULX).

33.1.1 Lantronix Devices

The EZWebCon management utility software may be used to configure Lantronix devices and update their firmware. Instead of entering commands at the Local prompt, configuration can be done through on-screen menus.

EZWebCon configuration wizard



The latest version of EZWebCon can be downloaded from the Lantronix website (www.lantronix.com). For detailed information, refer to the Lantronix documentation.

33.2 LNL-ETHLAN (MSS1/MSS100 Ethernet Controller)

This procedure can also be used for the MSS-VIA network adapter.

This Ethernet controller is a network device, and not a part of the UL certification. This device must have transient protection.

(A NULL MODEM CABLE IS REQUIRED)

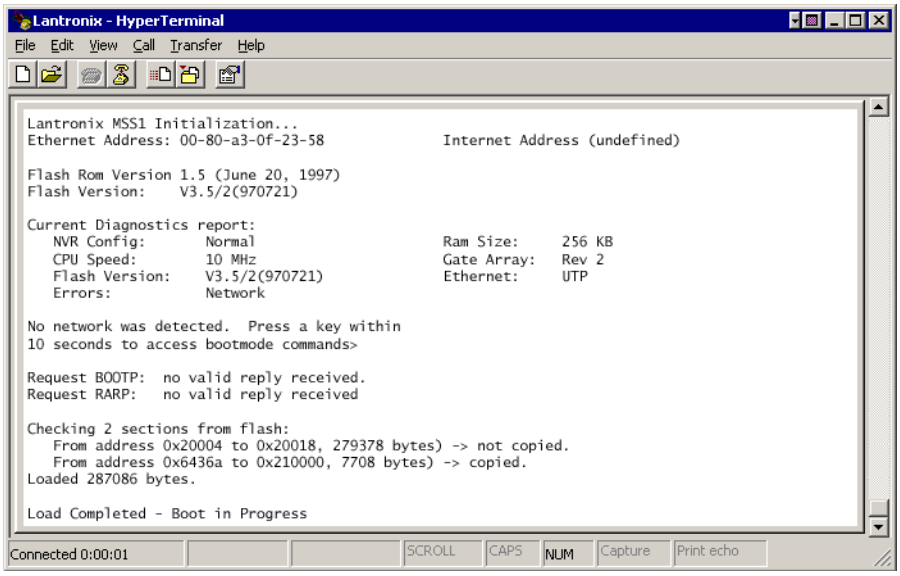
33.2.1 Establish Serial Communication with the ETHLAN

The controller-to-MSS100 or MSS1-T cable is now available, part number HOC-ETHLAN.

UL requirement: this device must be on the recommended UPS (#HO2070) or equivalent

1. With the power OFF to the ETHLAN devices, establish a serial connection from the ETHLAN to the PC's Serial Communication Port, for example, using the HyperTerminal. (A Null Modem cable is required).
2. Start HyperTerminal.
3. Change the Communication settings to 9600 Baud, 8 data bits, 1 stop bit, and Parity None.
4. Plug in power to the ETHLAN. The following messages should appear in the terminal window.

Lantronix Telnet session


Lantronix - HyperTerminal
File Edit View Call Transfer Help
Lantronix MSS1 Initialization...
Ethernet Address: 00-80-a3-0f-23-58
Internet Address (undefined)
Flash Rom Version 1.5 (June 20, 1997)
Flash Version: V3.5/2(970721)
Current Diagnostics report:
NVR Config: Normal
CPU Speed: 10 MHz
Flash Version: V3.5/2(970721)
Errors: Network
Ram Size: 256 KB
Gate Array: Rev 2
Ethernet: UTP
No network was detected. Press a key within
10 seconds to access bootmode commands>
Request BOOTP: no valid reply received.
Request RARP: no valid reply received
Checking 2 sections from flash:
From address 0x20004 to 0x20018, 279378 bytes) -> not copied.
From address 0x6436a to 0x210000, 7708 bytes) -> copied.
Loaded 287086 bytes.
Load Completed - Boot in Progress
Connected 0:00:01
SCROLL
CAPS
NUM
Capture
Print echo

5. At this point, press the <Enter> key. (It may take a few seconds to complete booting).
   a. Power should be cycled to the device while connected to it in order to see the "Load Completed..." message.

b. If it appears that nothing changes after pressing the <Enter> key, it is possible that the Lantronix MSS1 or MSS100 device was already configured once. If this occurs, you need to press the <Enter> key before the phrase, "Load Completed-Boot in Progress" appears. If this still does not allow you to enter into the command mode, you may also telnet into the Lantronix device.

c. If the device was configured previously, it may be best to do a hard reset and configure it from scratch. To do this:

   i. Using the end of a paper clip, or a similar small object, hold down the reset button.

   ii. Cycle power to the device.

d. A prompt that says `Local_1>` should appear. If the prompt says `Boot>`, then the Ethernet Address has not been defined and you must enter one.

   i. At the `Boot>` prompt, `type:`

      `change hardware` *n*

      where *n* represents the last three digits of the Ethernet Address located on the bottom of the Lantronix box (Example: `change hardware 21-01-65`).

   ii. Reboot for the change to take effect.

   iii. Wait for it to finish loading. Once it's done, you should see a screen resembling the picture on the previous page.

6. You will be prompted for a user name. Enter any name.

33.2.2 Establishing Network Communications

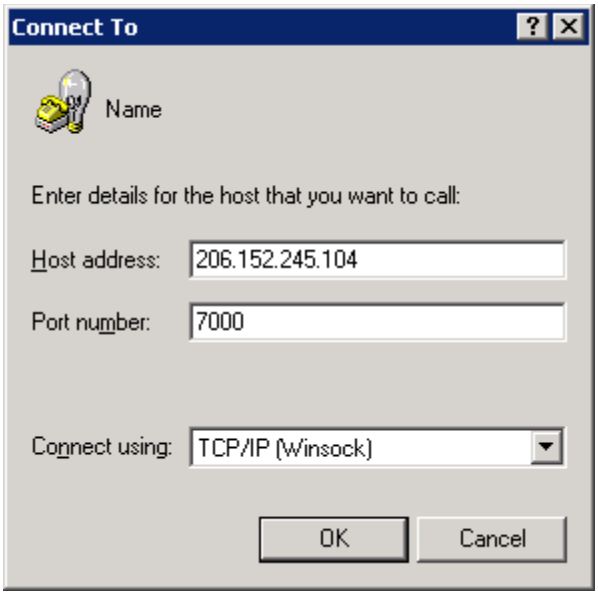
After a factory default reset, the following changes must be made:

1. At the prompt, type:
   `set privileged` and press <Enter>.
2. Type in the password:
   `system` and press <Enter>.
3. Determine and set the IP address. Type:
   `change ipaddress [IP ADDRESS]` and press <Enter>.
4. Set the Gateway. Type:
   `change gateway [GATEWAY]` and press <Enter>.
5. Set the boot flags. Type:
   `change bootp disabled` and press <Enter>
   `change dhcp disabled` and press <Enter>
   `change rarp disabled` and press <Enter>
6. Set the access type to remote. Type:
   `change access remote` and press <Enter>
7. At the prompt, type:
   logout and press <Enter>.
8. Exit from HyperTerminal and cycle power to the device.

33.2.3 Configuring the ETHLAN

Any additional changes specific to the hardware that the Lantronix box is connecting to should be made now. These may include, but are not limited to, baud rate, parity, stop bit, byte size, and flow control.

1. Make sure the device is powered, completely booted, and connected to the network. Start HyperTerminal.
2. You will be prompted for a session name. Enter a name of your choice.
3. Connect to the device using the IP address, port address of 7000.



4. A HyperTerminal session starts. Type:
   `access`
   and press <Enter>. The access command will not echo.
5. You will be prompted for a user name. Enter any name. There should be a command prompt.
6. Type:
   `set privileged`
   and press <Enter>.
7. The password prompt will appear. The password is `system`.
8. For baud rate, type:
   `change speed [SPEED]`
   and press <Enter> where [SPEED] = the baud rate (`9600`, `2400`, etc.)
9. For parity, type:
   `change parity [PARITY]`
   and press <Enter>, where [PARITY] = `none`, `even`, `odd`, `mark`, or `space`.
10. For stop bits, type:
    `change stopbits [BITS]`
    and press <Enter>, where [BITS] = `0`, `1`, or `2`.
11. For byte size, type:
    `change charsize [SIZE]`
    and press <Enter>, where [SIZE] = `7` or `8`.

12. For flow control, type:
    `change flow control [FLOW CONTROL]`
    and press <Enter>, where [FLOW CONTROL] = xonoff, ctsrts, slowcts, or none.
13. Type
    `change dedicated tcp port=3001`
    and press <Enter>.
14. (Optional) If you are going to connect to the device from across subnets or routers, you will need to program the subnet mask and gateway. The commands are:
    - `change subnet mask [your subnet mask]`
    - `change gateway [your gateway]`
15. Type in the following to disable BOOT and RARP, depressing the <Enter> key after each line.
    `LOCAL>>CHANGE BOOTP DISABLE`
    `LOCAL>>CHANGE RARP DISABLE`
16. Type `change access remote` and press <Enter>.
17. Disconnect from the device and exit.
18. If a subnet mask and gateway was programmed (step 9), you must recycle power to the device (the device must be rebooted) in order for the settings to take effect.
19. At this point, make sure that switch 5 on the ISC is configured correctly for hardware flow control. It should be set to “ON.”
20. To verify that the device is talking on the network you can “ping” the device from a command prompt by typing `ping <IP address>`.

33.3 LNL-ETHLAN-MICR (Micro Serial Server)

The ETHLAN-LITE/ETHLAN-MICR device plugs directly into the ISC panel. It should be labeled with its Ethernet/hardware address (example: 00-80-a3-2b-02-3b).

Assign this address to a TCP/IP address over the network by using the ARP utility. In order to do this, the ARP table on the Windows PC must have at least one IP address other than its own defined. If the ARP table is empty, the command will return an error message saying that the ARP table addition failed.

1. At the command prompt, type `ARP-A` to verify that there is at least one entry in the ARP table. If there is at least one entry, proceed to step #3.
2. If there is no other entry listed in the ARP table besides the local machine, ping another IP machine on the network to build the ARP table. You must ping a host other than the machine on which you are working.
3. After the entry is listed in the ARP table, use the following command to ARP the IP address:
    `arp -s <IP Address> <Ethernet/Hardware Address>`
    where the <IP address> is the numerical address (example: 192.168.002.203) and the <Ethernet/ Hardware Address> is the address labeled on the Micro Serial Server device (example: 00-80-a3-2b-02-3b).

Note: The ARP/ping method only works during the first two minutes of LNL-ETHLAN-MICR operation. If this process is not completed in time, then the LNL-ETHLAN-MICR must be rebooted and the ARP/ping process redone.

4. Ping the IP address to have the device acknowledge the IP assignment. There should be replies from the IP address if the ARP command was accepted.

Note: The ETHLAN-MICR will not save this learned IP address permanently; this procedure is intended as a temporary measure to allow an administrator to Telnet into the LNL-ETHLAN-MICR for configuration. Once the power is recycled on the device, the IP programming that is done with the arp command will be lost.

After doing this, telnet into the IP address to complete the rest of the device configuration starting from Section 33.2.2, Establishing Network Communications. It is critical to perform line item 3 (`change ipaddress <your ip address>` in order to lock in the temporary IP address assigned by the ARP process. This step makes the IP address static within the device.

Note: BOOTP and RARP are disabled using commands when configuring the device for use. DHCP is disabled when the device is shipped from Lenel. However, if an NVR reset is performed on the device, DHCP, BOOTP, and RARP will all be re-enabled and if there is a DHCP server on the network the unit will obtain an IP address automatically and you will not be able to use the ARP command for programming. If there is no DHCP server on the network, the DHCP option within the device will be disabled again once a static IP address is successfully programmed into the device.

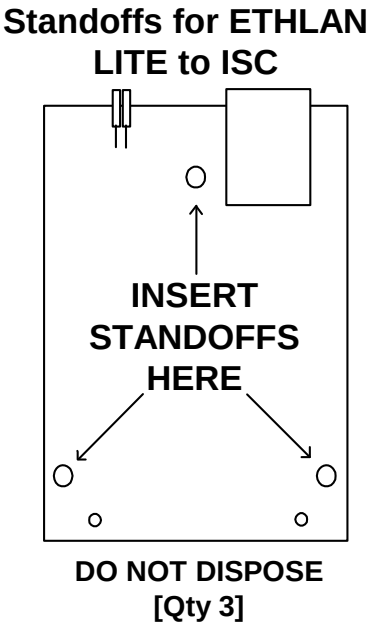
At this point you must completely power down the LNL-2000 controller for 15 seconds and then turn it back on.

Once this is done, use the access control software to define the ISC as a LAN panel at the IP address that was assigned. The panel will come online.

33.3.1 ETHLAN-MICR Standoffs

The standoffs for the ETHLAN-LITE/ETHLAN-MICR come in a separate package. The following diagram illustrates the positioning.

Richco plastic P/N LMSP-7-01



33.4 CoBox Micro 100

The CoBox Micro 100 device plugs directly into the LNL-2000 or the LNL-500 ISC. Jumper J13 must be in the OFF position for the device to communicate on the LNL-500 and jumper J26 must be in the OFF position for the device to communicate with the LNL-2000. If it is not in the OFF position, the ISC will be unable to detect the CoBox Micro 100. The jumper should be ON for all other communications methods.

It should be labeled with its Ethernet/hardware address (example: 00-20-4a-2b-02-3b).

The CoBox Micro 100 can communicate on a 10/100 base-T network.

Assign a TCP/IP address over the network by using the ARP utility. In order to do this, the ARP table on the Windows PC must have at least one IP address other than its own defined. If the ARP table is empty, the command will return an error message saying that the ARP table addition failed.

1. At the command prompt, type `ARP -A` to verify that there is at least one entry in the ARP table. If there is at least one entry, proceed to step #3.
2. If there is no other entry listed in the ARP table besides the local machine, ping another IP machine on the network to build the ARP table. You must ping a host other than the machine on which you are working.
3. After the entry is listed in the ARP table, use the following command to ARP the IP address:
   `arp -s <IP Address> <Ethernet/Hardware Address>`
   where the <IP address> is the numerical address (example: 192.168.002.203) and the <Ethernet/ Hardware Address> is the address labeled on the Micro Serial Server device (example: 00-20-4a -2b-02-3b).
4. Telnet to the assigned IP address and port 1, this should fail quickly (2-3 seconds). This will force CoBox Micro 100 to take the new assign IP address temporary.
   i.e.) TELNET 192.168.2.203 1

5. You now need to Telnet into the IP address to complete the rest of the device configuration.
   i.e.) TELNET 192.168.2.203 9999

The CoBox Micro 100 will not save this learned IP address permanently; this procedure is intended as a temporary measure to allow an administrator to Telnet into the CoBox Micro 100 for configuration. Steps 4 and 5 have to be preformed quickly after each other.

33.4.1 Configuring a CoBox Micro 100 using Telnet

The Cobox Micro 100 can be configured via Telnet or Lantronix's DeviceInstaller. The recommended method for configuration is Telnet. For more information about using DeviceInstaller, refer to the manufacturer documentation.

From the command prompt, type the following to enter the CoBox Micro 100 configuration menu:

```
telnet <IP Address> 9999
```

This command will open the IP Address using port 9999, which is reserved for configuration. Once the port is open, choose option `0` for Server configuration.

Once you are in the server configuration, you can set up the IP address, default gateway, and subnet mask to match your specific network configuration.

You will also need to enter a configuration password for the device. The password can be a maximum of 4 characters only, unless enhanced password is enabled. For more information, refer to the CoBox Micro 100 documentation.

Note: Lenel recommends that you increase the security by enabling enhanced passwords. This allows for a maximum of 16 characters in the password.

After the Server configuration is complete, choose option `1` for Channel 1 configuration. Make the following changes in the configuration menu:

1. Baud rate = **38400**
2. I/F mode = **4C**. See Common I/F Mode Valueson page 197.
3. Flow Control = **02**. See Common Flow Control Valueson page 197.
4. Port Number = **3001**
5. Connection Mode = **C0**
6. Send ‘+++’ in Modem Mode = **Y**
7. Auto Increment Source Port = **N**
8. Remote IP Address = **(000). (000). (000). (000)**
9. Remote Port = **00000**
10. DisConnMode = **00**
11. Flush Mode = **00**
12. Disconnect Time = **00:00**
13. Send Char 1 = **00**

14. Send Char 2 = **00**

When these changes have been made, type ‘9’ at the main screen to save the changes and exit. The changes will be stored in the CoBox Micro 100 and the connection will be terminated.

To verify that the changes were stored correctly, cycle the power on the CoBox Micro 100 and when it has rebooted, go to the command prompt and Telnet to the IP Address that was just given to the device and port 9999 (example: TELNET 192.168.2.203 9999).

The configuration page will display a summary of current settings. Verify that all settings are configured properly and exit the Telnet session.

```
MAC address 00204A83503E
Software version V6.1.0.2 (060404) M100

Press Enter for Setup Mode


*** basic parameters
Hardware: Ethernet TPI
IP addr 10.112.6.28, no gateway set

*** Security
SNMP is               enabled
SNMP Community Name: public
Telnet Setup is       enabled
TFTP Download is      enabled
Port 77FEh is         enabled
Web Server is         enabled
Web Setup is          enabled
ECHO is               disabled
Enhanced Password is disabled

*** Channel 1
Baudrate 38400, I/F Mode 4C, Flow 02
Port 03001
Connect Mode : C0
Send '+++' in Modem Mode enabled
Auto increment source port disabled
Remote IP Adr: --- none ---, Port 00000
Disconn Mode : 00
Flush   Mode : 00

*** Channel 2
Baudrate 9600, I/F Mode 4C, Flow 00
Port 10002
Connect Mode : C0
Send '+++' in Modem Mode enabled
Auto increment source port disabled
Remote IP Adr: --- none ---, Port 00000
Disconn Mode : 00
Flush   Mode : 00

*** Expert
TCP Keepalive    : 45s
ARP cache timeout: 600s
Monitor Mode @ bootup : enabled
HTTP Port Number : 80
MTU Size: 1400
Alternate MAC: disabled
Ethernet connection type: auto-negotiate
```

33.4.2 Security Enhancements

Past installations may have contained vulnerabilities which could lead to unauthorized access to the CoBox Micro 100. The recommended security settings are not necessary for the unit to work correctly; however, they are *highly recommended* to bridge any security gaps left open from previous installations.

In order to configure the security settings, telnet into the unit to access the setup options:

```
telnet <IP Address> 9999
```

This command will open the unit using port 9999, which is reserved for configuration.

Note: Beyond securing the following internal settings of the Lantronix CoBox Micro 100, networking firewalls should be used to mask services that should not be publicly exposed. Many security problems can be avoided if servers and networks are appropriately configured.

Enhanced Password

By default, the Cobox Micro 100 does not have a password assigned. In Server Options, you may assign a four-digit password. While a 4-digit password is a step toward securing the unit, it is highly recommended to enable Enhanced Passwords, which will allow for a maximum of 16 digits. This can be set under Security (option 6).

Port 77FE

It is recommended that you disable port 77FE. This is an IP port that allows DeviceInstaller, Web-Manager, and custom programs to configure the unit remotely. Disabling this port prevents unauthorized access to this unit. If this is not done, it is possible to find this open port using a port scan tool. In addition, any networked user who installs DeviceInstaller on their machine may be able to change settings to the unit. Note: Port 77FE must be enabled for DeviceInstaller Software to detect the unit.

Web Server

After configuration is completed, it is recommended that you disable Web Server. While it is helpful to configure the unit via the Web Server, it does not support enhanced password protection. So it is a good idea to turn this feature off.

33.4.3 Firmware

To ensure that enhanced security is in place, download the latest firmware. Download the latest firmware from the Lantronix website, www.lantronix.com. There are two recommended methods to update the unit's internal operational code: via DeviceInstaller or via TFTP.

Upgrading Firmware via DeviceInstaller

Use the correct version of DeviceInstaller with the correct version of the firmware. For more information, refer to the DeviceInstaller documentation. Microsoft .NET Framework version 1.1 is also required.

Upon running DeviceInstaller, the software searches for any devices on the LAN. If there are devices present but they are not detected by the software, you must assign an IP address to it. Assign a TCP/IP address over the network by using the ARP utility. If it is already configured but still does not show up in the DeviceInstaller search, verify that port 77FE is enabled.

After the firmware upgrade has been completed, disable port 77FE to prevent unauthorized access to this device.

Otherwise, the device should show up in DeviceInstaller. To upgrade the firmware:

1. Select the device. The line will be highlighted.
2. Click [Upgrade].
3. The Device Upgrade Wizard will appear. Select **Create a custom installation by specifying individual files**. Click [Next].
4. Enter the path for the downloaded firmware by either typing it in or clicking [Browse]. Click [Next].
5. If you wish to upgrade the internal Web Server, select **Install files contained in COB partitions**. Click [Next]. If you do NOT wish to upgrade the internal Web Server, select **Do not copy or replace any files** and proceed to step 6.
   a. Select the partition number and click [Set Partition].
   b. Locate the .cob file. Click [OK].
   c. Click [Next].
6. You may save this installation for later use, if you wish, by clicking [Save Installation]. This is particularly useful for upgrading multiple devices.
7. Click [Next] to begin updating the device. A status bar indicates the progress of the update.
8. After the update completes successfully, the device will reboot and there will be a temporary loss of communication to the ISC.
9. Click [Close].
   - If communications are not restored, power down the ISC for at least 10 seconds, then power it up once again.

Upgrading the Firmware via TFTP

1. Before upgrading, verify communication with the device. At the command prompt, type:
   `ping <IP address>`
2. To upgrade the firmware, type:
   `tftp-i <ip address> put <firmware source> 3L`
   For example: `tftp-i 10.112.5.92 put d:\lantronix\micro\ltx5801.rom 3L`
3. After the update completes successfully, the device will reboot and there will be a temporary loss of communication to the ISC.
4. If you wish to upgrade the internal web interface, type:
   `tftp-i <ip address> put <internal web interface> WEB6`
   For example: `tftp-i 10.112.5.92 put d:\lantronix\micro\cbx360.cob WEB6`
5. Upon successful upgrade, a confirmation message will be displayed.

33.4.4 Troubleshooting Micro 100 Products

There may be a problem with the latest version of the on-board Ethernet devices for the LNL-500 and LNL-2000. A change was made to the device during production that will cause the following problems. This applies to the LNL-ETHLAN-MICR ONLY. It does not apply to the older 10 MB version of the units, only the latest units that are 10/100 MB and have been shipping since March 2004.

- **LNL-ETHLAN-MICR with firmware version 5.4** If Micro-100 unit's power is cycled, the unit will not restore communications unless the reset button on the Micro is pressed.

- **LNL-ETHLAN-MICR with firmware version 5.5** If Micro-100 unit's power is cycled, the unit will fail to restore communications 1/20 times.

In all cases, Lantronix and our Quality Assurance Group have confirmed that removal of Pin 10 will eliminate all communication failures due to power cycling. Setup and unit configuration remain the same as as documented.

33.4.5 Removal of Reset Pin

Use the following procedure to remove Pin 10 from the Micro 100 product.

1. Using an ESD grounding strap, ground yourself and remove the Micro 100 from the anti-static bag or the housing.
2. Locate Pin 10 of Conn1 on the back side of the Micro 100 unit.
3. Protect your eyes with safety goggles. Using shear cutters, cut Pin 10.
4. Replace the Micro 100 into the anti-static bag, or to the equipment that houses the Micro 100.

33.5 CoBox Token Ring Serial Server (LNL-COBOX-201TR)

(A STRAIGHT THROUGH CABLE IS REQUIRED)

Network Requirements:

Token Ring hub

Machine Requirements:

A PC is needed to configure the CoBox Token Ring Serial Server. The machine must have the following installed:

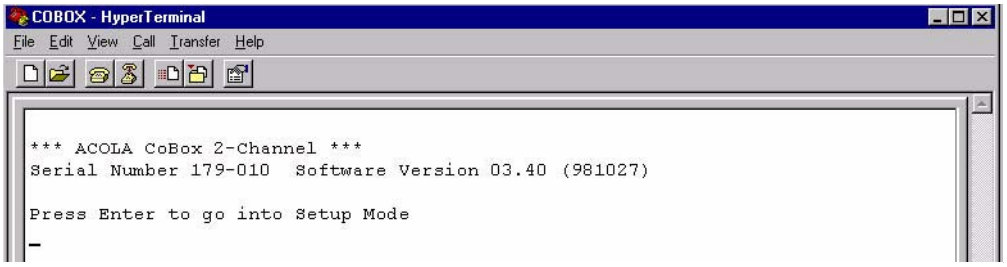
- Token Ring Network Interface Card (NIC)
- OnGuard Software
- HyperTerminal Software

To Configure the CoBox Token Ring Serial Server (part # LNL-COBOX-TR201):

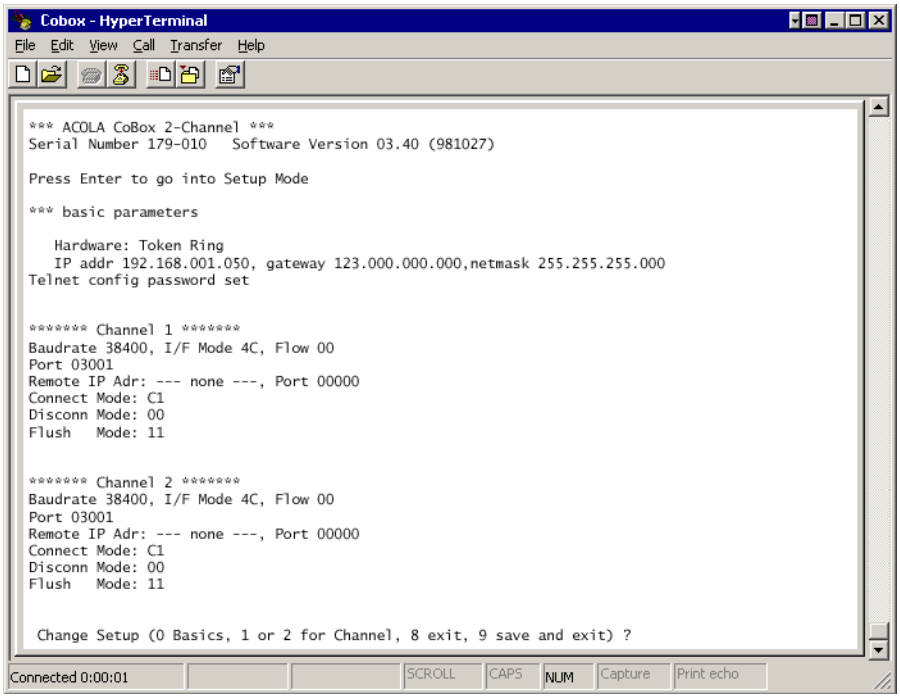
Step 1: Establish Serial Communication with CoBox

1. With the power OFF to the CoBox device and the network disconnected, establish a serial connection from the CoBox to the PC's Serial Communication Port, for example, using HyperTerminal. (A straight through cable is required).
2. Start HyperTerminal. The Connection Description window will open with the "New Connection" setting. (Choose **New Connection** from the **File** menu if the Connection Description window does not open).
3. In the **Name** field, type `COBOX` and click [OK].

4. Select **Direct Connect** and choose the COM port to which the cable is connected on the computer.
5. Change the Communication settings to: 9600 Baud, 8 data bits, 1 stop bit, and No Parity.
6. Once in Terminal mode, hold down the <x> key on the keyboard and plug in power to the CoBox device. The following will appear on the screen (version and serial numbers may be different):


COBOX - HyperTerminal
File Edit View Call Transfer Help
*** ACOLA CoBox 2-Channel ***
Serial Number 179-010 Software Version 03.40 (981027)
Press Enter to go into Setup Mode

7. Press <Enter> to go into the CoBox device's setup mode. The CoBox device's current configuration will be displayed. It will look similar to the following:


Cobox - HyperTerminal
File Edit View Call Transfer Help
*** ACOLA CoBox 2-Channel ***
Serial Number 179-010 Software Version 03.40 (981027)
Press Enter to go into Setup Mode
*** basic parameters
Hardware: Token Ring
IP addr 192.168.001.050, gateway 123.000.000.000,netmask 255.255.255.000
Telnet config password set
******* Channel 1 *******
Baudrate 38400, I/F Mode 4C, Flow 00
Port 03001
Remote IP Adr: --- none ---, Port 00000
Connect Mode: C1
Disconn Mode: 00
Flush Mode: 11
******* Channel 2 *******
Baudrate 38400, I/F Mode 4C, Flow 00
Port 03001
Remote IP Adr: --- none ---, Port 00000
Connect Mode: C1
Disconn Mode: 00
Flush Mode: 11
Change Setup (0 Basics, 1 or 2 for Channel, 8 exit, 9 save and exit) ?
Connected 0:00:01
SCROLL
CAPS
NUM
Capture
Print echo

8. Type `0` and then press the <Enter> key to enter the basic setup for the CoBox device.
9. Enter the IP address for the CoBox device in the form of 10.11.12.13. The currently configured address will appear as you get to each part of the IP address as you are typing; just continue to type the new number.
10. The software will next ask you if you wish to set the gateway. Answer yes and type the gateway IP address just as you did for the IP address of the device. As it did for the device's IP address, the current configuration information will display at each segment of the IP address.

11. You now need to enter a subnet mask. You CANNOT enter a number here as you are used to, you must use the following table to determine what to type into this field.

255.255.255.252	=02	255.255.252.0	=10	255.252.0.0	=18
255.255.255.248	=03	255.255.248.0	=11	255.248.0.0	=19
255.255.255.240	=04	255.255.240.0	=12	255.240.0.0	=20
255.255.255.224	=05	255.255.224.0	=13	255.224.0.0	=21
255.255.255.192	=06	255.255.192.0	=14	255.192.0.0	=22
255.255.255.128	=07	255.255.128.0	=15	255.128.0.0	=23
255.255.255.0	=08	255.255.0.0	=16	255.0.0.0	=24
255.255.254.0	=09	255.254.0.0	=17		

12. You will be prompted to change the Telnet configuration password. Answer `Yes` to the prompt.
13. Enter `SYST` for the password when prompted.
14. When asked to use a token-ring administered address answer NO.
15. You will now be at the setup screen. Make sure the information displayed at the top matched the information you just typed into the unit.

Step 2: Entering the Serial Port Setup Menu

1. Type `1` and then press the <Enter> key to enter the serial port setup menu. For each item, enter the following value:

Item	Value
Baud rate	38400
I/F mode	4C
Flow control	00
Port #	03002
Connect mode	C1
Remote IP address	0.0.0.0
Remote port	00000
Disconnect mode	00
Flush mode	11
Disconnect time	00:00
Send char 1	00
Send char 2	00

Information is available for hexidecimal values. See Commonly Used Valueson page 197.

2. You will now be back at the setup screen. Type 2 and then press the <Enter> key to enter the serial port setup menu. For each item, enter the following value.

Item	Value
Baud rate	38400
I/F mode	4C
Flow control	00
Port #	03001
Connect mode	C1
Remote IP address	0.0.0.0
Remote port	00000
Disconnect mode	00
Flush mode	11
Disconnect time	00:00
Send char 1	00
Send char 2	00

3. You will now be back at the setup screen. Type 9 and then press the <Enter> key to save the setup information and exit the CoBox setup menus.
4. The device is now configured to work with the network. Power the machine down, connect it to the network, and then power it up.

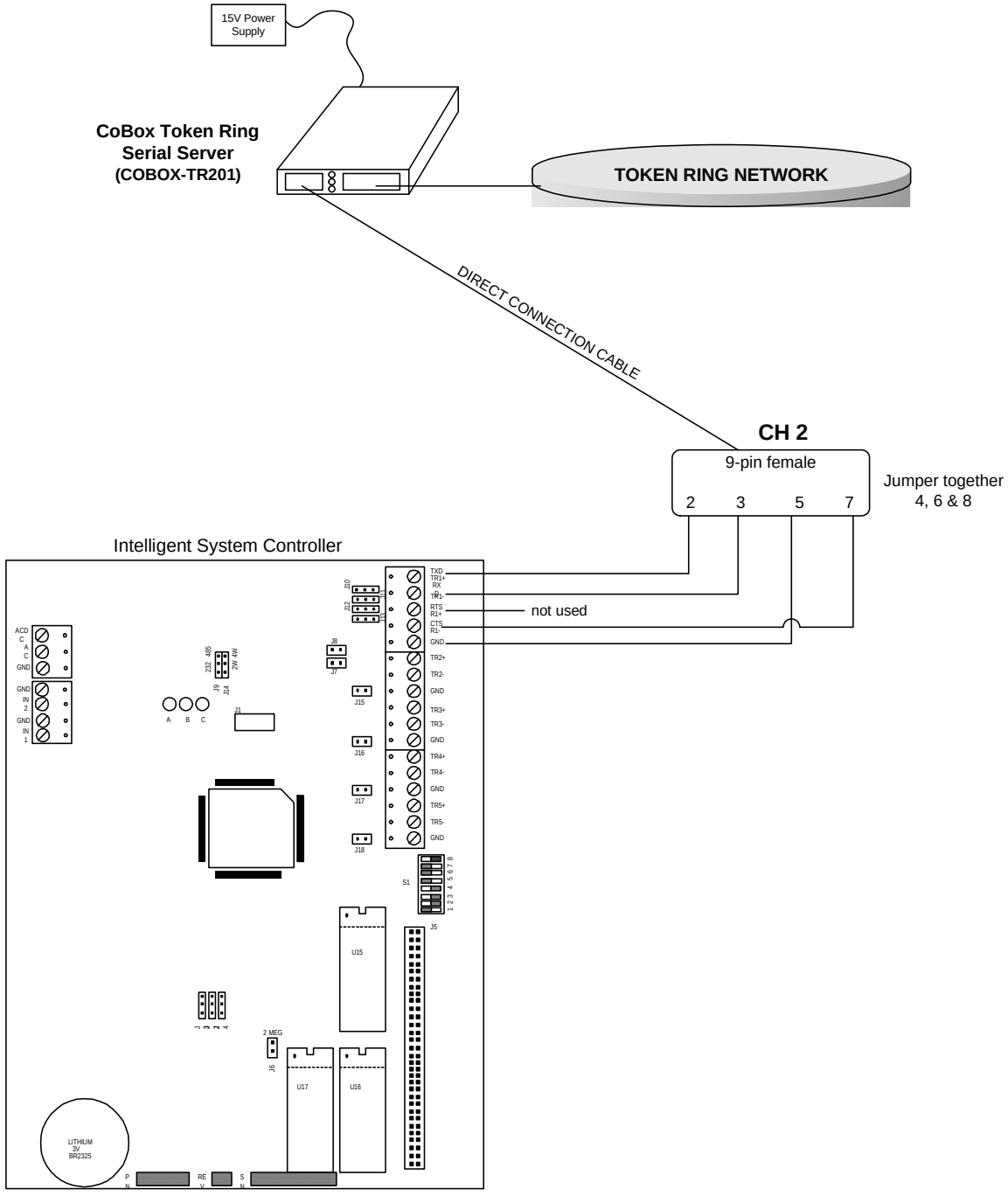
Step 3: Connecting the ISC to the CoBox Device

1. Connect the ISC to the CH2 port of the CoBox device using a direct connection cable according to the cable pinout table below.

Cable Pinouts	
ISC	**9-pin female**
TXD/TR1+	pin 2
RXD/TR1-	pin 3
RTS/R1+	not used
CTS/R1-	pin 7
GND	pin 5
Jumper together	4,6 & 8

2. Add the panel in the System Administration application, using the IP address of the CoBox. This is the same IP address that was entered in Step 1, procedure number 10.
3. Run the Access Control Driver and Alarm Monitoring applications. Verify that the panel came online.

ISC to Lantronix CoBox Token Ring Serial Server Configuration

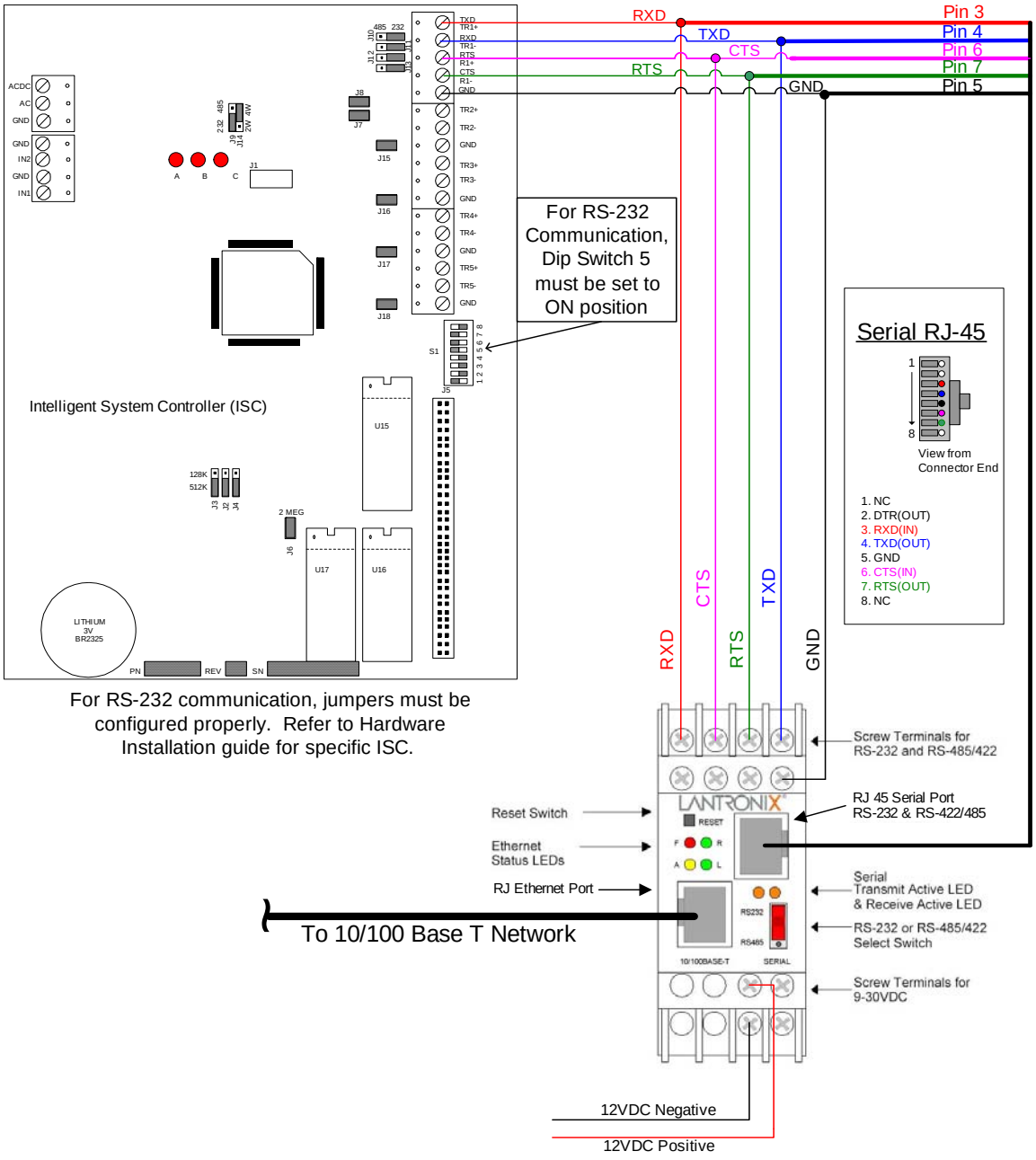


33.6 Lantronix CoBox-DR

The ISC can alternatively be connected to the Lantronix CoBox-DR unit. Use the following information to set up the CoBox-DR unit and the ISC.

33.6.1 DSTni-Xpress DR RS-232 Configuration for the ISC

Connection to the ISC can either be through screw terminals or RJ-45 serial port.



For RS-232 communication, jumpers must be configured properly. Refer to Hardware Installation guide for specific ISC.

To configure the server and channel 1, refer to the following screen shots.

Information is available for hexidecimal values. See Commonly Used Valueson page 197.

Server configuration

```
****************** Channel 1 ******************
Baudrate 38400, I/F Mode 4C, Flow 02
Port 3001
Remote IP Adr: --- none ---, Port 00000
Connect Mode : C0  Disconn Mode: 00
Flush   Mode : 00

****************** Expert ******************
TCP Keepalive     : 45s
ARP cache timeout : 600s

Change Setup  : 0 Server configuration
                1 Channel 1 configuration
                5 Expert settings
                6 Security
                7 Factory defaults
                8 Exit without save
                9 Save and exit                 Your choice ? 0
IP Address : (206) .(152) .(245) .(159)
Set Gateway IP Address (Y) Y
Gateway IP addr (206) .(152) .(245) .(254)
Netmask: Number of Bits for Host Part (0=default) (8)
Change telnet config password (N) N
```

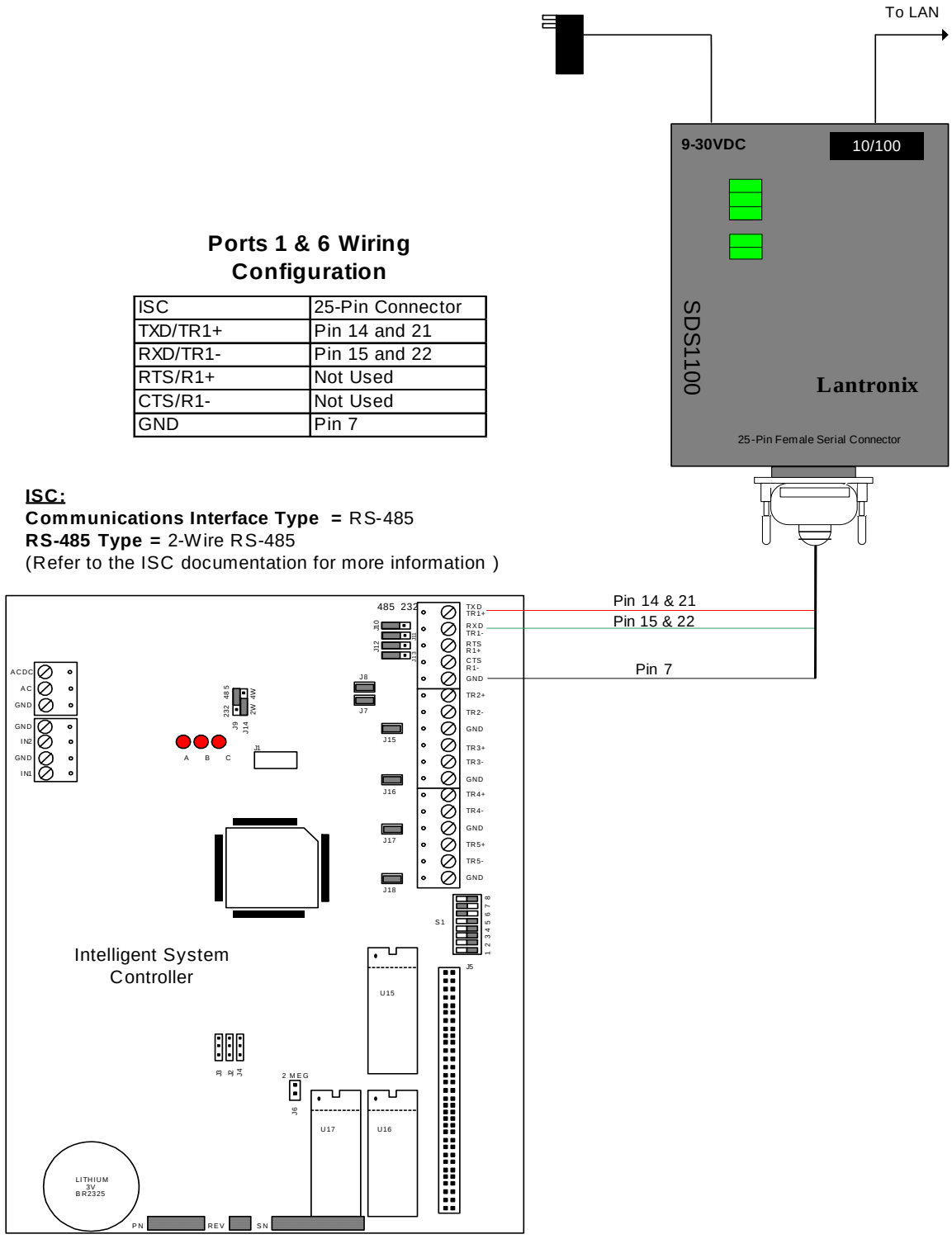
Channel 1 configuration

```
Change Setup  : 0 Server configuration
                1 Channel 1 configuration
                5 Expert settings
                6 Security
                7 Factory defaults
                8 Exit without save
                9 Save and exit                 Your choice ? 1
Baudrate (38400) ?
I/F Mode (4C) ?
Flow (02) ?
Port No (3001) ?
ConnectMode (C0) ?
Remote IP Address : (000) .(000) .(000) .(000)
Remote Port (0) ?
DisConnMode (00) ?
FlushMode   (00) ?
DisConnTime (00:00) ?:
SendChar 1  (00) ?
SendChar 2  (00) ?
```

33.7 Lantronix SecureBox SDS1100/1101

Connect the SDS device with an ISC.

SDS1100 to ISC, 2-wire RS-485

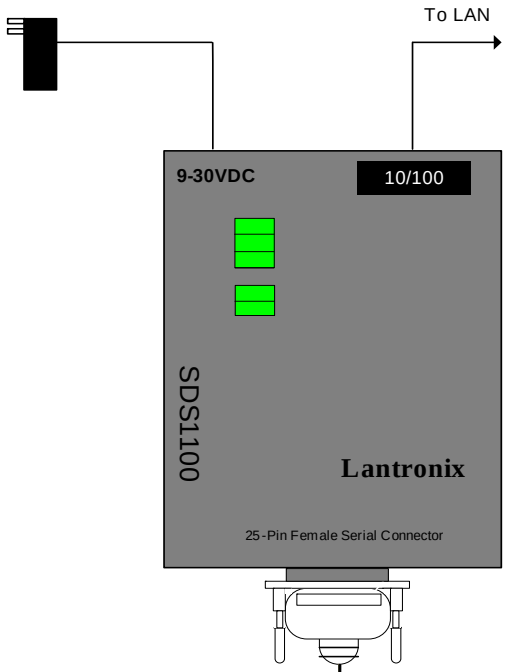


Ports 1 & 6 Wiring Configuration

ISC	25-Pin Connector
TXD/TR1+	Pin 14 and 21
RXD/TR1-	Pin 15 and 22
RTS/R1+	Not Used
CTS/R1-	Not Used
GND	Pin 7

ISC:
Communications Interface Type = RS-485
RS-485 Type = 2-Wire RS-485
(Refer to the ISC documentation for more information)

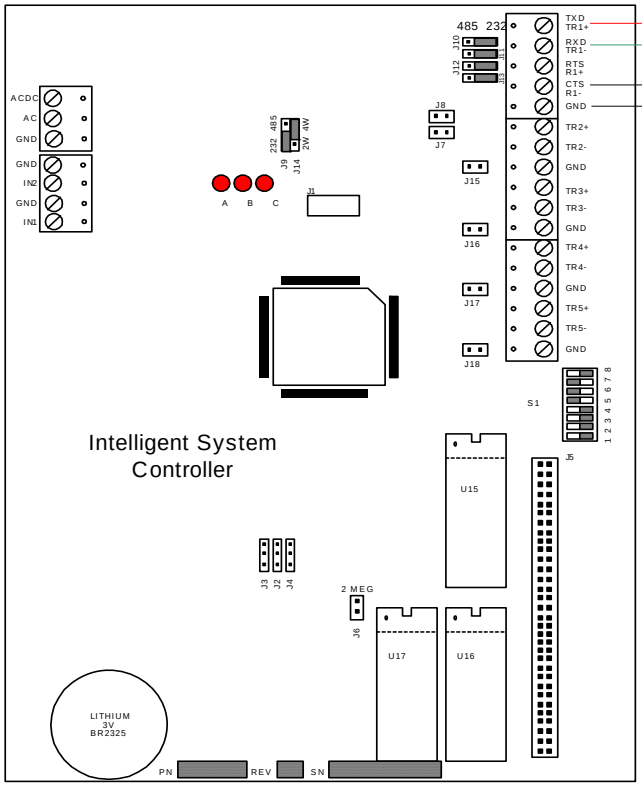
SDS1100 to ISC, 4-wire RS-485



Ports 1 & 6 Wiring Configuration

ISC	25-Pin Connector
TXD/TR1+	Pin 2
RXD/TR1-	Pin 3
RTS/R1+	Not Used
CTS/R1-	Pins 4 & 5
GND	Pin 7
Jumper Together	6,8 & 20

ISC:
Communications Interface Type = RS-232
RS-232 Type = 4-Wire RS-232
(Refer to the ISC documentation for more information)



Pin 2
Pin 3
Pin 4 & 5
Pin 7

33.7.1 Configuration of the SDS1100/1101/CoBox-FL

To configure this Lantronix device, perform the following procedures. You may configure through a telnet connection over the network, or a terminal program over a serial connection. For more information, refer to the Lantronix User Guide.

Notes:
These instructions also apply for the CoBox-FL, with the exception of encryption. Encryption is not available on the CoBox-FL.

Encryption using the Lantronix SDS is supported only for third-party devices, and not Lenel access panels. Ensure that encryption is turned off for use with Lenel access panels.

Using Telnet

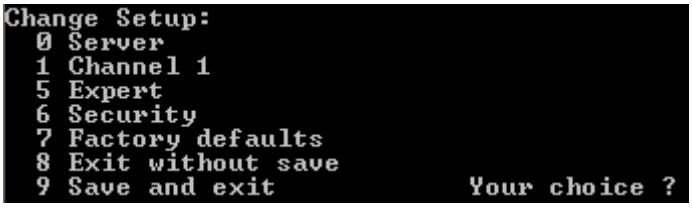
1. From the command prompt, type the following to enter the configuration menu:
   `telnet <IP Address> 9999`
   Or, in Unix:
   `telnet <IP Address>:9999`
   This command will open the IP Address using port 9999, which is reserved for configuration.

Lantronix SDS settings

*** Lantronix Secure Device Server ***
MAC address 00204A80A747
Software version V5.8.0.1 (041014) SDS1100
AES library version 1.8.2.1
Press Enter for Setup Mode

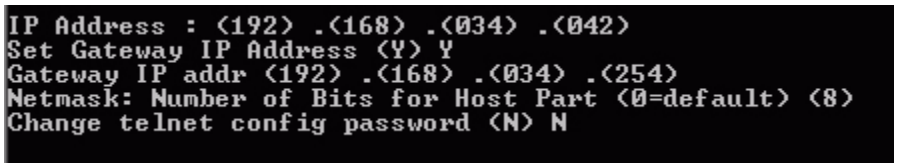
2. Press <Enter> to go into the setup mode. The Change Setup menu is displayed.

Change Setup menu



3. Type the number of the option you would like to access. Press <Enter>.
4. Select the option which you would like to change and type in the new value. If you would like to just confirm the current setting, do not type anything. Press <Enter>.
5. Select `0` for Server, the device's current settings are displayed.

Server configuration


IP Address : (192) .(168) .(034) .(042)
Set Gateway IP Address (Y) Y
Gateway IP addr (192) .(168) .(034) .(254)
Netmask: Number of Bits for Host Part (0=default) (8)
Change telnet config password (N) N

a. **IP Address**. If DHCP is not used to assign IP addresses, enter the IP address manually. The IP address must be set to a unique value in the network. Enter each octet and press <Enter> between each section. The current value displays in parentheses.

b. **Gateway IP Address**. The gateway address, or router, allows communication to other LAN segments. The gateway address should be the IP address of the router connected to the same LAN segment as the unit. The gateway address must be within the local network. The default setting is N (No), meaning the gateway address has not been set. To set the gateway address, type Y and enter the address.

c. **Netmask: Number of Bits for Host Part**. A netmask defines the number of bits taken from the IP address that are assigned for the host part.

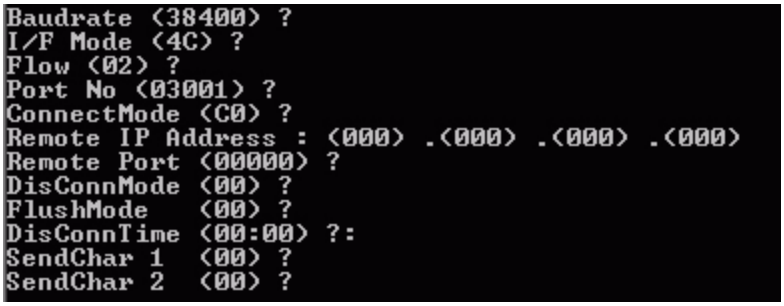
Note: Class A: 24 bits; Class B: 16 bits; Class C: 8 bits

The unit prompts for the number of host bits to be entered, then calculates the netmask, which appears in standard decimal-dot notation (for example, 255.255.255.0) when the saved parameters are shown. The default setting is 0.

d. **Change telnet config password**. Setting the telnet configuration password prevents unauthorized access to the setup menu through a telnet connection to port 9999 or through web pages. The password must have four characters. The default setting is N (No). (You do not need a password to access the Setup Mode window by a serial connection.) This setting is optional.

6. You will need to configure the serial port to communicate with the third party hardware devices. (Some of the characters need to be entered in hexadecimal notation.) Select `1` for Channel 1 define how the serial port responds to network and serial communications.

Channel 1 configuration



a. **Baudrate**. The unit and attached serial device, such as a modem, must have matching speed or baud rates to use for the serial connection. Valid baud rates are 300, 600, 1200, 2400, 4800, 9600 (default), 19200, 38400, 57600, 115200, and 230400 baud.

b. **I/F Mode**. The Interface (I/F) Mode is a bit-coded byte entered in hexadecimal notation. The default setting is 4C. See Common I/F Mode Valueson page 197.

c. **Flow**. Flow control sets the local handshaking method for stopping serial input/output. The default setting is 00. See Common Flow Control Valueson page 197.

d. **Port No**. The port number setting represents the source port number in TCP connections. It is the number that identifies the channel for remote initiating connections. The default is port 10001. The range is 1-65535. This should always be set to 3001 in order to communicate with third party hardware devices.

e. **Connect Mode**. Connect Mode defines how the unit makes a connection, and how it reacts to incoming connections over the network. The default setting is C0 and should be used to communicate with third party hardware devices.

The following may be left at default settings:

f. Remote IP Address.

g. Remote Port.

h. DosConnMode.

i. FlushMode.

j. DisConnTime.

k. SendChar 1.

l. SendChar 2.

7. When the configuration is complete, type `9` in the Change Setup menu to save your settings and exit. The device will reboot. Or, to exit without saving any of your changes, type `8`.

Using a Terminal Program

Use a terminal program to configure the device through a serial connection.

1. Connect the device to a console terminal or PC running a terminal emulation program using the serial port. The default serial port settings are 9600 baud, 8 bits, no parity, 1 stop bit, no flow control.
2. Reset the device by cycling the unit's power (turning the power off and back on). Immediately upon resetting the device, type `xxx`.

Note: The easiest way to enter Setup Mode is to hold down the x key at the terminal (or emulation) while resetting the unit. You must do this within three seconds of resetting the device.

3. At this point, the screen display is the same as a telnet connection. To continue, go to step 2 under Using Telnet.

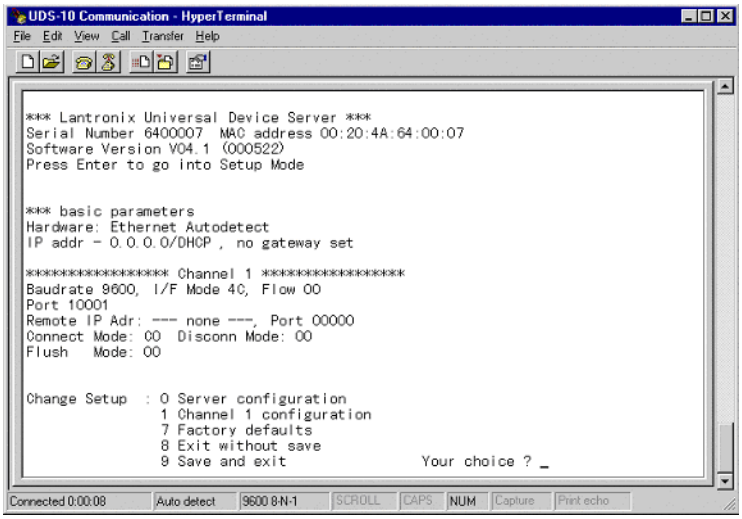
33.8 Lantronix UDS-10/UDS100/UDS200/UDS1100

Step 1: Establish a serial connection with ETHLAN

With the power OFF on the UDS device, establish a serial communication from the UDS to the PC’s serial communication port, for example, using HyperTerminal.

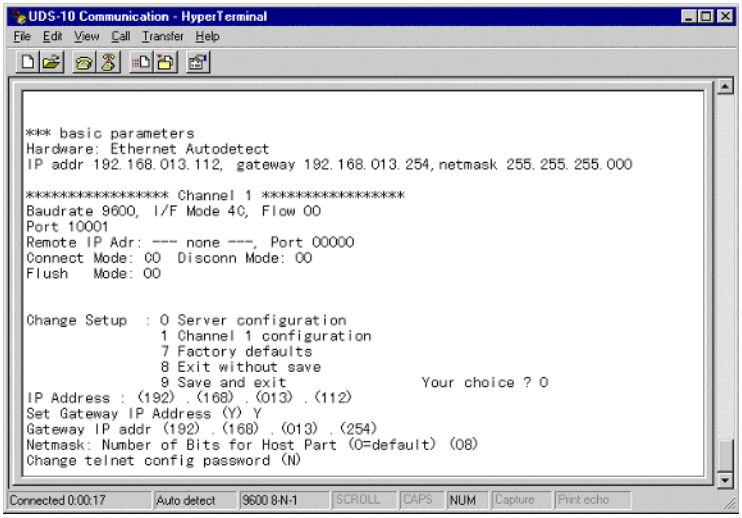
1. Start HyperTerminal.
2. Select the correct PC port and change the communication settings to 9600 baud, 8 data bit, and parity none.

3. Hold down the <X> key on your keyboard and plug the power back into the UDS device. This will allow you to enter the setup mode on the ETHLAN.
4. At this point, type <Enter>, and follow the onscreen instructions for programming.
5. When prompted for a password, please use UDS and press <Enter>.



Step 2: Establish network communication

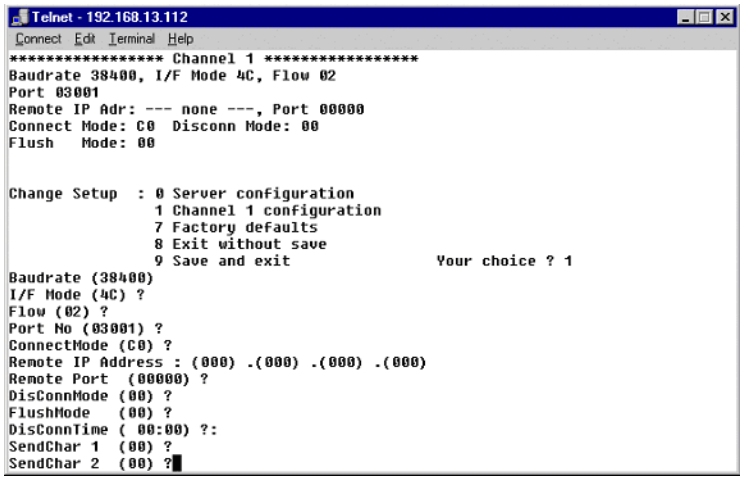
1. Determine the IP address that will be programmed into the UDS.
2. Enter the Server Configuration menu by typing 0 and hitting <Enter>.
3. Follow the onscreen instructions and enter all your necessary network settings.
4. Refer to the manufacturer manual when entering the subnet mask information. Note: for standard class C subnet, enter an 8.
5. Once you have finished entering all your custom network settings, type a 9 at the prompt. This will save all your network configurations and reboot the UDS.
6. You can close your current HyperTerminal session.


UDS-10 Communication - HyperTerminal
File Edit View Call Transfer Help
*** basic parameters
Hardware: Ethernet Autodetect
IP addr 192.168.013.112, gateway 192.168.013.254, netmask 255.255.255.000
********** Channel 1 **********
Baudrate 9600, I/F Mode 4C, Flow 00
Port 10001
Remote IP Adr: --- none ---, Port 00000
Connect Mode: 00 Disconn Mode: 00
Flush Mode: 00
Change Setup : 0 Server configuration
1 Channel 1 configuration
7 Factory defaults
8 Exit without save
9 Save and exit
Your choice ? 0
IP Address : (192) .(168) .(013) .(112)
Set Gateway IP Address (Y) Y
Gateway IP addr (192) .(168) .(013) .(254)
Netmask: Number of Bits for Host Part (0=default) (08)
Change telnet config password (N)
Connected 0:00:17
Auto detect
9600 8-N-1
SCROLL
CAPS
NUM
Capture
Print echo

Step 3: Configure the UDS ETHLAN

Make sure that the device is powered up, completely booted, and connected to the Network.

1. Start Telnet.
2. From the connect menu, connect to the device using the IP address, Port address of 9999, and terminal type of VT100.
3. You will see the same configuration screen as before, now hit <Enter> and go into the setup.
4. At the selections prompt, type `1` and hit <Enter> to go into the Channel Configurations menu.
5. Once you are in the setup for channel 1 configuration, please make the following changes:
   a. Baud rate = 38400
   b. I/F mode = 4C. See Common I/F Mode Valueson page 197.
   c. Flow Control = 02. See Common Flow Control Valueson page 197.
   d. Port Number = 3001
   e. Connection Mode = C0
   f. Remote IP Address = (000). (000). (000). (000)
   g. Remote Port = 00000
   h. DisConnMode = 00
   i. Flush Mode = 00
   j. Disconnect Time = 00:00
   k. Send Char 1 = 00
   l. Send Char 2 = 00
6. Once these settings have been properly configured, enter `9` at the prompt to save changes and exit.
7. Close the Telnet session.
8. Cycle the power manually on the UDS and let it reboot.
9. At this point, make sure that switch 5 on the ISC is configured correctly for hardware flow control. It should be set to “ON.”
10. To verify that the device is talking on the network you can “ping” from the command prompt by typing `ping IP address`.


Telnet - 192.168.13.112
Connect Edit Terminal Help
********** Channel 1 **********
Baudrate 38400, I/F Mode 4C, Flow 02
Port 03001
Remote IP Adr: --- none ---, Port 00000
Connect Mode: C0 Disconn Mode: 00
Flush Mode: 00
Change Setup : 0 Server configuration
1 Channel 1 configuration
7 Factory defaults
8 Exit without save
9 Save and exit Your choice ? 1
Baudrate (38400)
I/F Mode (4C) ?
Flow (02) ?
Port No (03001) ?
ConnectMode (C0) ?
Remote IP Address : (000) .(000) .(000) .(000)
Remote Port (00000) ?
DisConnMode (00) ?
FlushMode (00) ?
DisConnTime (00:00) ?:
SendChar 1 (00) ?
SendChar 2 (00) ?

33.8.1 Wiring Configuration for Custom DB25 Serial Cable

The cable for the UDS must be a straight through cable. The Other LANTRONIX devices, such as the MSS-100, require a null cable for serial communication to the ISC. The cable is also different because the MSS-100 uses a serial cable with a female DB25 connector. The UDS custom cable must have a male connector because the fixed serial port on the device has a female adapter.

TXD	Pin 2
RXD	Pin 3
RTS	Pin 4
CTS	Pin 5
GND	Pin 7

Note: Refer to the manufacturer installation manual for more information on the custom cable and pin out information.

33.8.2 Connecting the UDS with an ISC

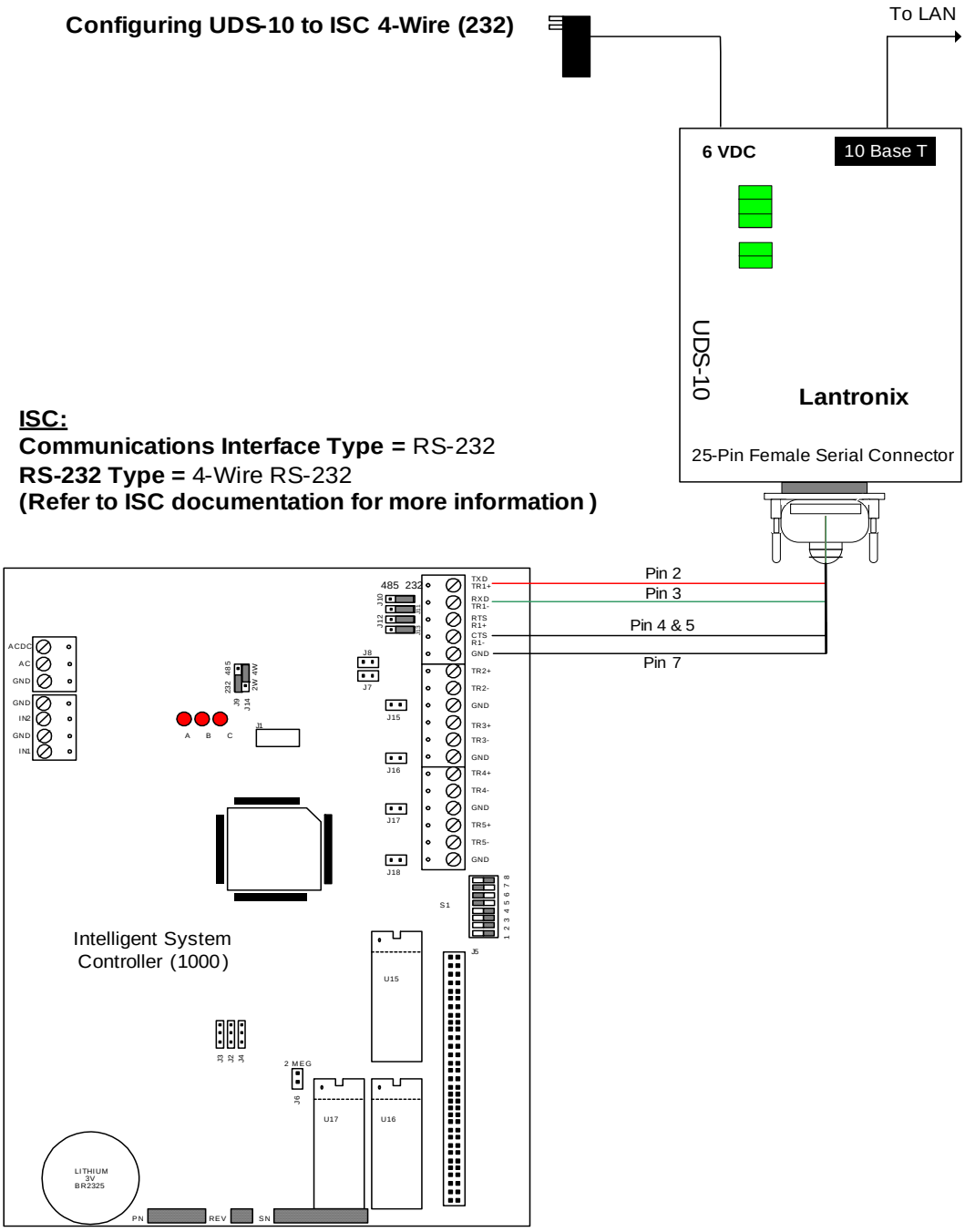
These units operate on 10-base T. Make sure that if connected to a hub, that it is 10 base T or auto-sensing 10/100.

Wiring for RS-232 4-wire.

Ports 1 and 6 wiring configuration for 4-wire (RS-232)

ISC	25-pin connector
TXD/TR1+	Pin 2
RXD/TR1-	Pin 3
RTS/R1+	Not used
CTS/R1-	Pins 4 and 5
GND	Pin 7
Jumper together	6, 8, and 20

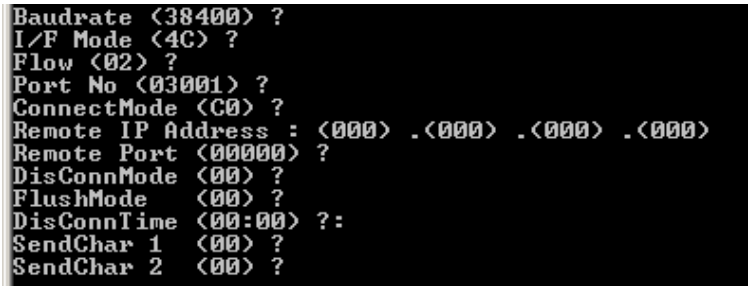
Configuring UDS-10 to ISC 4-Wire (232)



ISC:
Communications Interface Type = RS-232
RS-232 Type = 4-Wire RS-232
(Refer to ISC documentation for more information)

Unit Setup (RS-232 4-wire)

As of March 2004, the current firmware version is 4.5. Connect to the unit via Telnet through port 9999. The Channel 1 configuration is shown below.



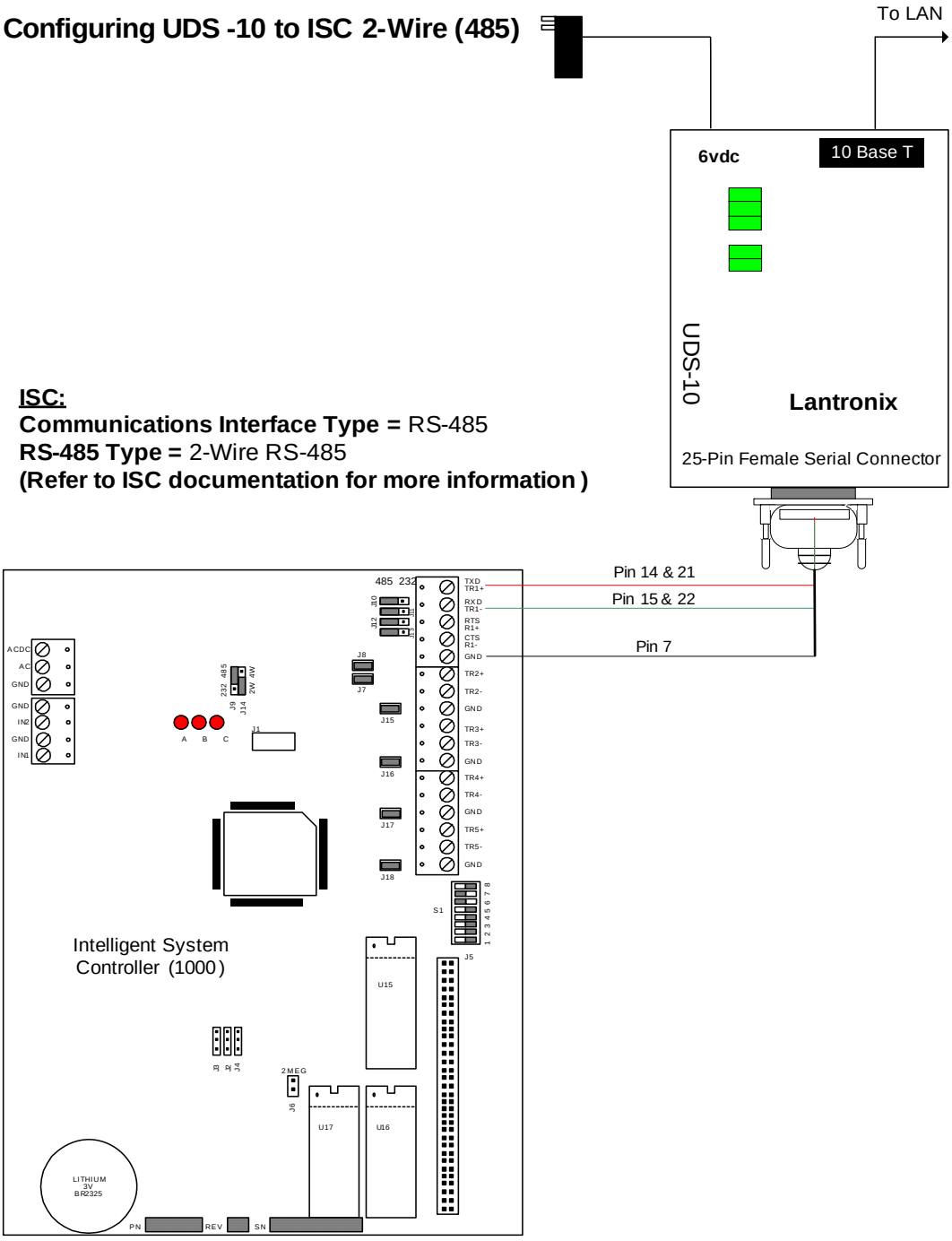
Wiring for RS-485 2-wire

Ports 1 and 6 wiring configuration for 2-wire (RS-485)

ISC	25-pin connector
TXD/TR1+	Pins 14 and 21
RXD/TR1-	Pins 15 and 22
RTS/R1+	Not used
CTS/R1-	Not used
GND	Pin 7

Note: The pinouts in the earlier UDS-10 Installation Guide are incorrect! The correct pinout for an RS-485 connection are as follows:
7 — Ground
14 — TX+
15 — TX-
21 — RX+
22 — RX-

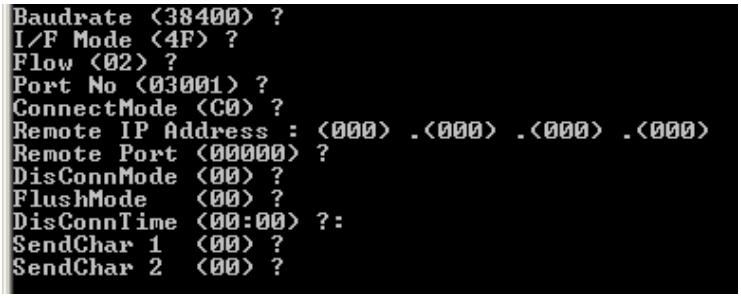
Configuring UDS -10 to ISC 2-Wire (485)



ISC:
Communications Interface Type = RS-485
RS-485 Type = 2-Wire RS-485
(Refer to ISC documentation for more information)

Unit Setup (RS-485 2-wire)

As of March 2004, the current firmware version is 4.5. Connect to the unit via Telnet through port 9999. The Channel 1 configuration is shown below.



33.9 Commonly Used Values

Interface (I/F) mode is a bit-coded byte entered in hexadecimal notation, as is flow control.

Common I/F Mode Values

I/F Mode	Description
F8	RS-232, 2 stop bits, even parity, 7-bit byte size
78	RS-232, 1 stop bit, even parity, 7-bit byte size
4C	RS-232, 1 stop bit, no parity, 8-bit byte size
5C	RS-232, 1 stop bit, odd parity, 8-bit byte size

Common Flow Control Values

Flow Control	Description
00	No flow control
02	Hardware handshake with RTC/CTS lines

33.10 LNL-IC108A/IC109A RS-232 to RS-485 Converter (4-wire)

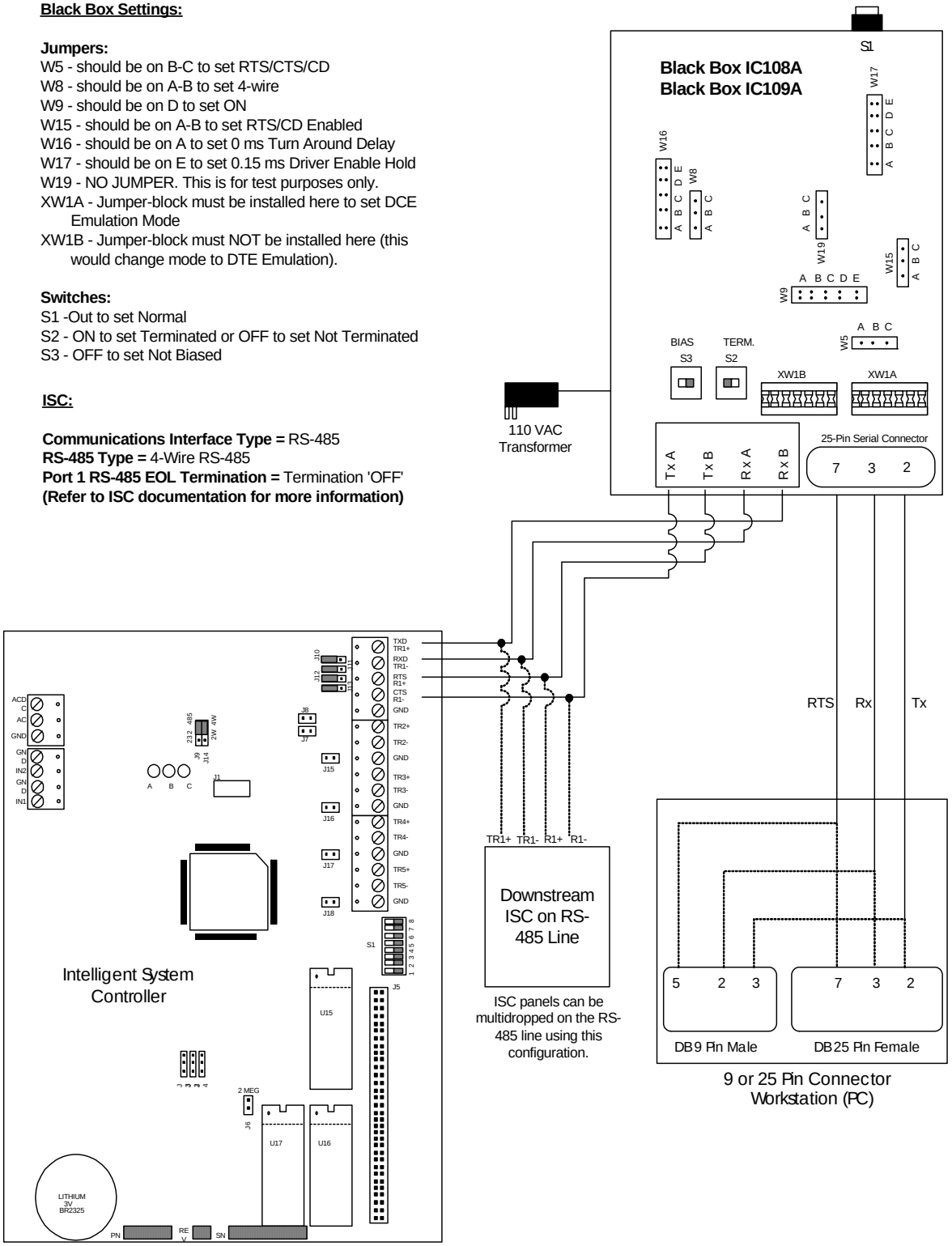
Black Box Settings:

Jumpers:
W5 - should be on B-C to set RTS/CTS/CD
W8 - should be on A-B to set 4-wire
W9 - should be on D to set ON
W15 - should be on A-B to set RTS/CD Enabled
W16 - should be on A to set 0 ms Turn Around Delay
W17 - should be on E to set 0.15 ms Driver Enable Hold
W19 - NO JUMPER. This is for test purposes only.
XW1A - Jumper-block must be installed here to set DCE Emulation Mode
XW1B - Jumper-block must NOT be installed here (this would change mode to DTE Emulation).

Switches:
S1 -Out to set Normal
S2 - ON to set Terminated or OFF to set Not Terminated
S3 - OFF to set Not Biased

ISC:

Communications Interface Type = RS-485
RS-485 Type = 4-Wire RS-485
Port 1 RS-485 EOL Termination = Termination 'OFF'
(Refer to ISC documentation for more information)



33.11 LNL-IC108A/IC109A RS-232 to RS-485 Converter (2-Wire)

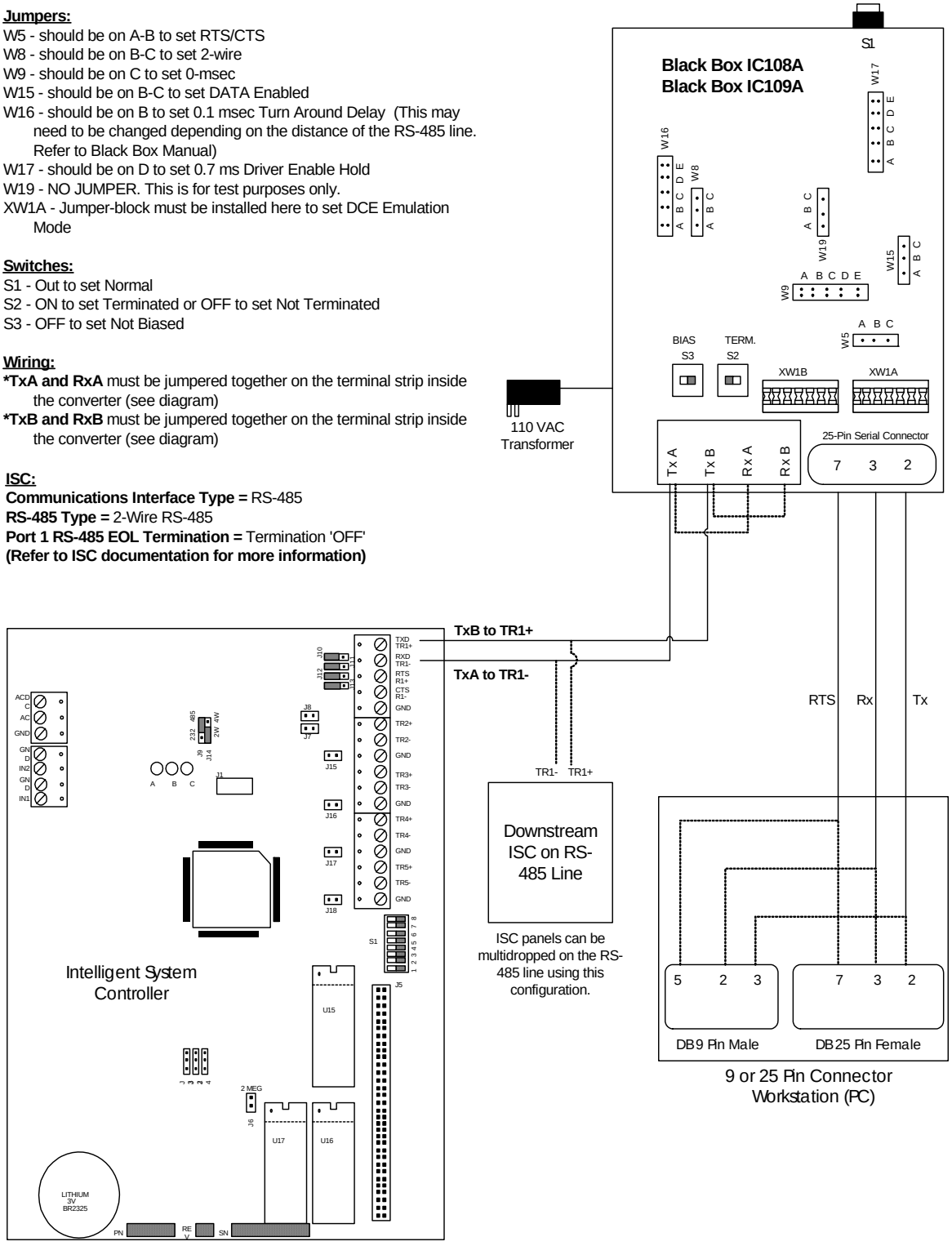
Black Box Settings:

Jumpers:
W5 - should be on A-B to set RTS/CTS
W8 - should be on B-C to set 2-wire
W9 - should be on C to set 0-msec
W15 - should be on B-C to set DATA Enabled
W16 - should be on B to set 0.1 msec Turn Around Delay (This may need to be changed depending on the distance of the RS-485 line. Refer to Black Box Manual)
W17 - should be on D to set 0.7 ms Driver Enable Hold
W19 - NO JUMPER. This is for test purposes only.
XW1A - Jumper-block must be installed here to set DCE Emulation Mode

Switches:
S1 - Out to set Normal
S2 - ON to set Terminated or OFF to set Not Terminated
S3 - OFF to set Not Biased

Wiring:
***TxA and RxA** must be jumpered together on the terminal strip inside the converter (see diagram)
***TxB and RxB** must be jumpered together on the terminal strip inside the converter (see diagram)

ISC:
Communications Interface Type = RS-485
RS-485 Type = 2-Wire RS-485
Port 1 RS-485 EOL Termination = Termination 'OFF'
(Refer to ISC documentation for more information)



33.12 Configuring Two LNL-838A RS-232 to RS-485 Converters

Use the following information to set up black boxes LNL-838A (LD485A).

33.12.1 Black Box Settings for 2-wire RS-485 Configuration

Jumpers

```
W5 should be on A-B to set RTS/CTS.
W8 should be on B-C to set 2-wire
W9 should be on C to set 0-msec
W15 should be on B-C to set DATA Enabled
W16 should be on B to set 0.1 msec Turn Around Delay. This may need to
be changed depending on the distance of the RS-485 line. Refer to the
Black Box manual.
W17 should be on D to set 0.15 ms Driver Enable Hold
W19 - NO JUMPER. This is for testing purposes only.
XW1A - Jumper-block must be installed here to set DCE Emulation Mode.
```

Switches

```
S1 - Out to set Normal
S2 - ON to set Terminated
S3 - OFF to set Not Biased
```

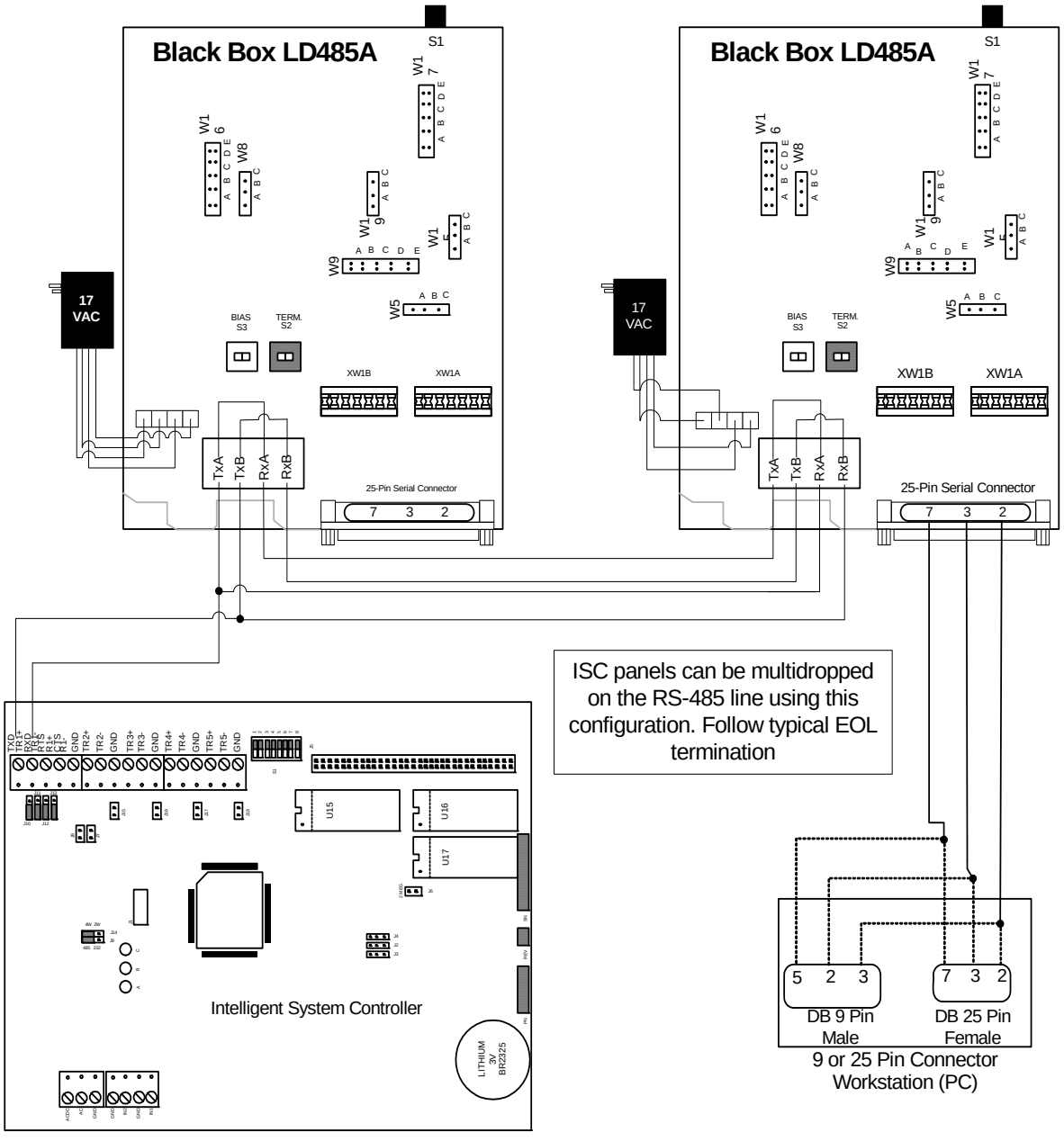
ISC

```
Communication Interface Type: RS-485
RS-485 Type: 2-wire RS-485
Port 1 RS-485 EOL Termination: Termination OFF
```

33.12.2 Wiring

TxA and RxA must be jumpered together on the terminal strip inside the converter (see diagram). TxB and RxB must be jumpered together on the terminal strip inside the converter (see diagram).

2-wire RS-485


Black Box LD485A
S1
W1
W8
W9
W5
17 VAC
BIAS S3
TERM. S2
XW1B
XW1A
TxA
TxB
RxA
RxB
25-Pin Serial Connector
Black Box LD485A
ISC panels can be multidropped on the RS-485 line using this configuration. Follow typical EOL termination
Intelligent System Controller
LITHIUM 3V BR2325
5 2 3
DB 9 Pin Male
7 3 2
DB 25 Pin Female
9 or 25 Pin Connector
Workstation (PC)

33.12.3 Black Box Settings for 4-wire RS-485

Jumpers

```
W5 should be on A-B to set RTS/CTS.
W8 should be on B-C to set 4-wire
W9 should be on C to set 0-msec
W15 should be on B-C to set DATA Enabled
W16 should be on B to set 0.1 msec Turn Around Delay. This may need to
be changed depending on the distance of the RS-485 line. Refer to the
Black Box manual.
W17 should be on D to set 0.15 ms Driver Enable Hold
W19 - NO JUMPER. This is for testing purposes only.
XW1A - Jumper-block must be installed here to set DCE Emulation Mode.
```

Switches

```
S1 - Out to set Normal
S2 - ON to set Terminated
S3 - OFF to set Not Biased
```

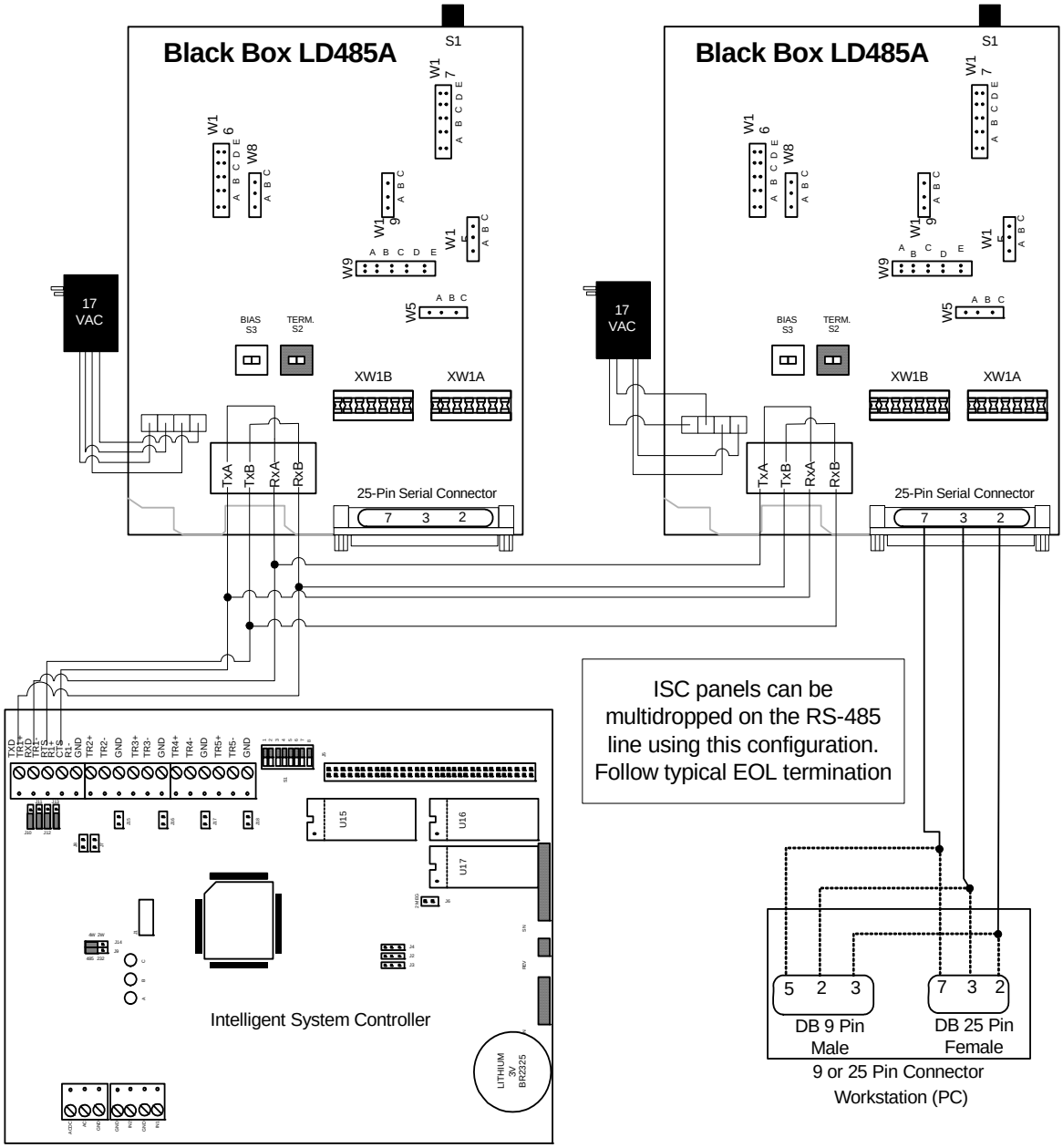
ISC

```
Communication Interface Type: RS-485
RS-485 Type: 4-wire RS-485
Port 1 RS-485 EOL Termination: Termination OFF
```

33.12.4 Wiring

TxA and RxA must be jumpered together on the terminal strip inside the converter (see diagram). TxB and RxB must be jumpered together on the terminal strip inside the converter (see diagram).

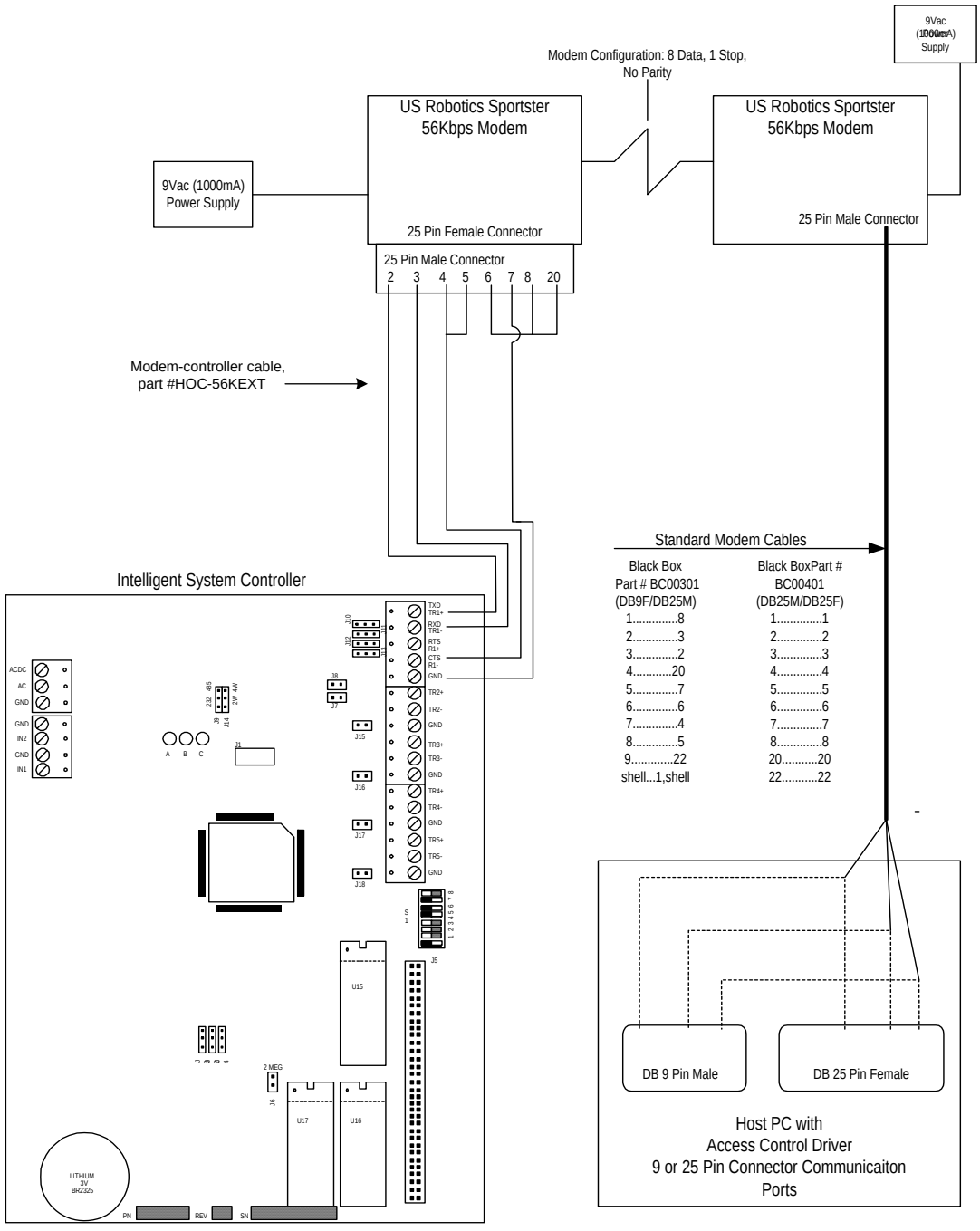
4-wire RS-485 Configuration



33.13 Dial-Up Configuration for the ISC

Refer to the following diagram for dial-up configuration. Note: ALL DIAL-UP PANELS MUST BE SET TO ADDRESS 1 OR DIAL-BACK CAPACITY WILL FAIL. Modem DIP Switches 1, 3, 4, 5, and 8 should be ON. DIP Switches 2, 6, and 7 should be OFF.

Dial-Up Configuration

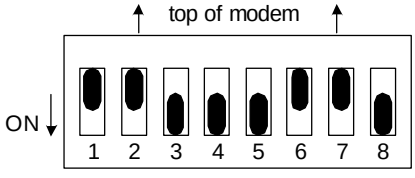


The US Robotics Sportster 56Kbps modems (LNL-56KEXT) have eight DIP switches which need to be configured. They are located on the back of the modem.

DIP SWITCH SETTINGS		
DIP Switch	**Position**	**Definition**
1	UP	Data Terminal Ready normal
	DOWN	Data Terminal Ready Override
2	UP	Verbal result codes
	DOWN	Numeric result codes
3	UP	Suppress result codes
	DOWN	Display result codes
4	UP	Echo offline commands
	DOWN	No echo, offline commands
5	UP	Auto answer on first ring, or higher if specified in NVRAM
	DOWN	Auto answer off
6	UP	Carrier detect normal
	DOWN	Carrier detect override
7	UP	Load NVRAM defaults
	DOWN	Load factory defaults
8	UP	Dumb mode
	DOWN	Smart mode

The default configuration for the ISC modem and **panel end** modem DIP Switches are as follows (notice DIP switch #1 is down):

The default configuration for the ISC and **host end** modem DIP Switches are as follows (notice DIP switch #1 is up):



The Sportster modem also has a row of indicator lights in the front:

ARQ/FAX	Error control
CS	Clear to send
TR	Terminal ready
SD	Send Data
RD	Received Data
CD	Carrier Detect
AA	Auto Answer

33.13.1 Courier 3Com U.S. Robotics 56K (external) Modem

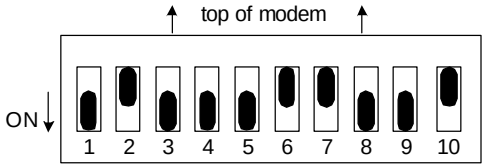
Features of this modem include:

- Up to 56K bps download capability using ITU V.92 technology.
- Ultra-fast throughput with 230.4K bps DTE port.
- If a loss of carrier is detected, the modem automatically redials the last number called.
- Modem settings can be configured from a remote location.
- Dial security (including dial back) – authorized callers and modems are verified prior to passing a remotely originating call. Dial back can also be initiated based on device configuration.
- Future proof with Flash ROM and Flash DSP for software enhancements and upgrades.
- Supports two-wire leased line applications.

Note: Installing the US Robotics ControlCenter will allow flash updates of the modem firmware. For more information, refer to the US Robotics documentation.

For the access control software to function properly, the DIP switches must be configured as follows.

DIP switch settings



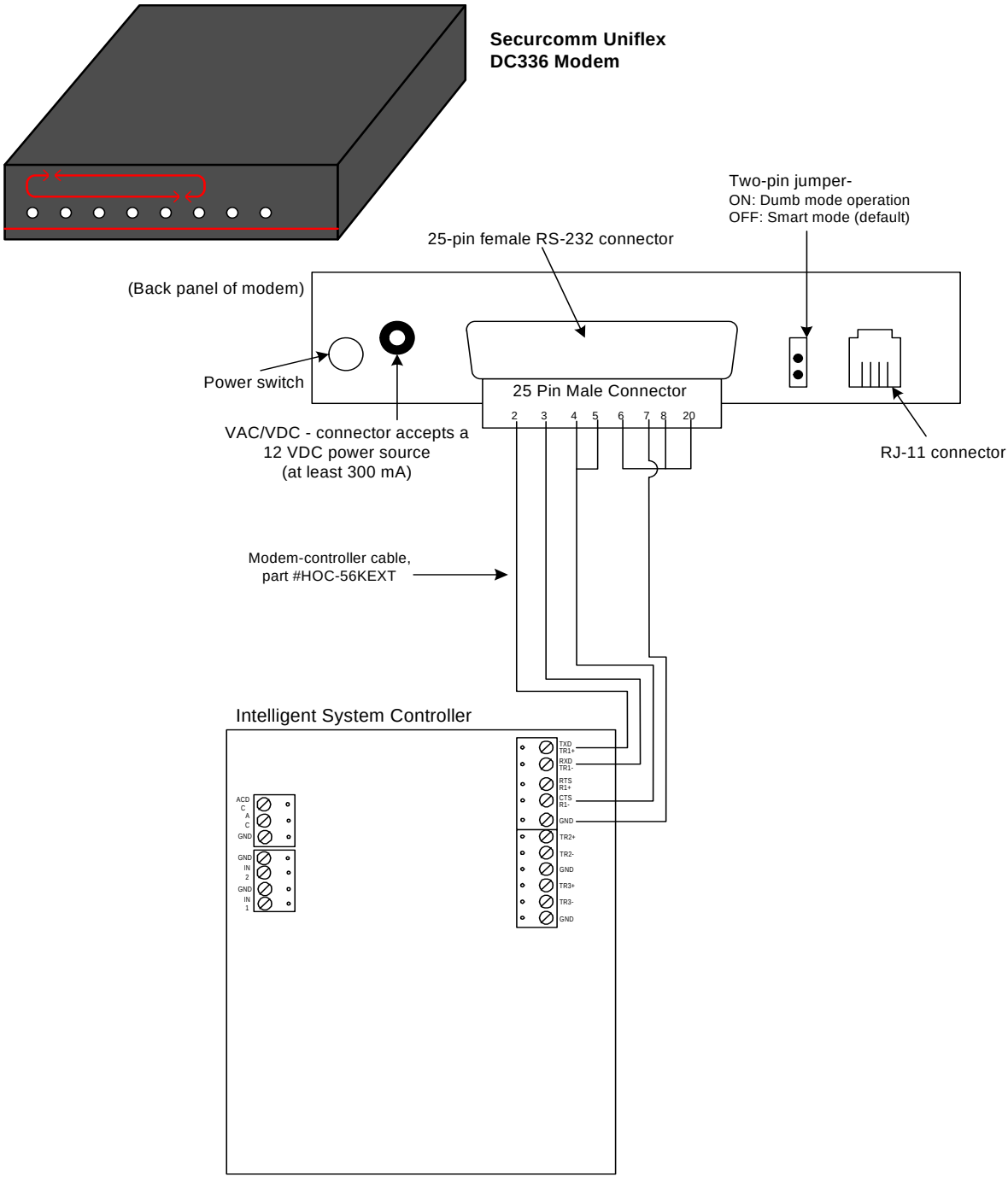
Once the modem is set up, you must send the following “AT” command sequences for the modem to work with the access control software.

1. Connect to the modem via a terminal program, such as HyperTerminal.

2. Enter the following commands:
   AT&F0<Enter>
   AT+PIG=1+PMH=1+PQC=3<Enter>
   ATY0X4T&A3&B1&H1&R2&W0<Enter>
3. Exit the terminal program.

33.14 Securcomm Uniflex DC336 Modems (12 VDC)

The Securcomm Uniflex DC336 modem (LNL-DC336) is the recommended modem for (ISC) dial-up configurations for the ISC end. Refer to the following diagram for wiring the modem and panel.



RJ-11 Connector	Used to connect the modem to a normal dial circuit or a dedicated 2-wire leased circuit
Power Connector	Provides DC voltages to the modem (rack mount versions)

Two-Pin Jumper	The modem can be set to dumb mode or smart mode using the two-pin jumper located on the back panel of the modem. Use a jumper to connect the two pins for dumb mode. For smart mode, leave them off (unconnected). The default setting for Lenel hardware is smart mode. When the modem is in dumb mode, it operates as though it has no command mode. When the modem is powered on or reset, it will go directly into the mode of operation for which it has been configured. The purpose of dumb mode is for leased lines and special dial applications. If the modem is in dumb mode and it becomes necessary to reconfigure it, remove the dumb mode jumper and then cycle power to the modem. It will then be in command (smart) mode.

This modem functions best when using DTR override with command echo disabled. The factory default setting is “DTR drop causes the modem to hang up, auto-dial is inhibited.” To configure these settings, do the following:

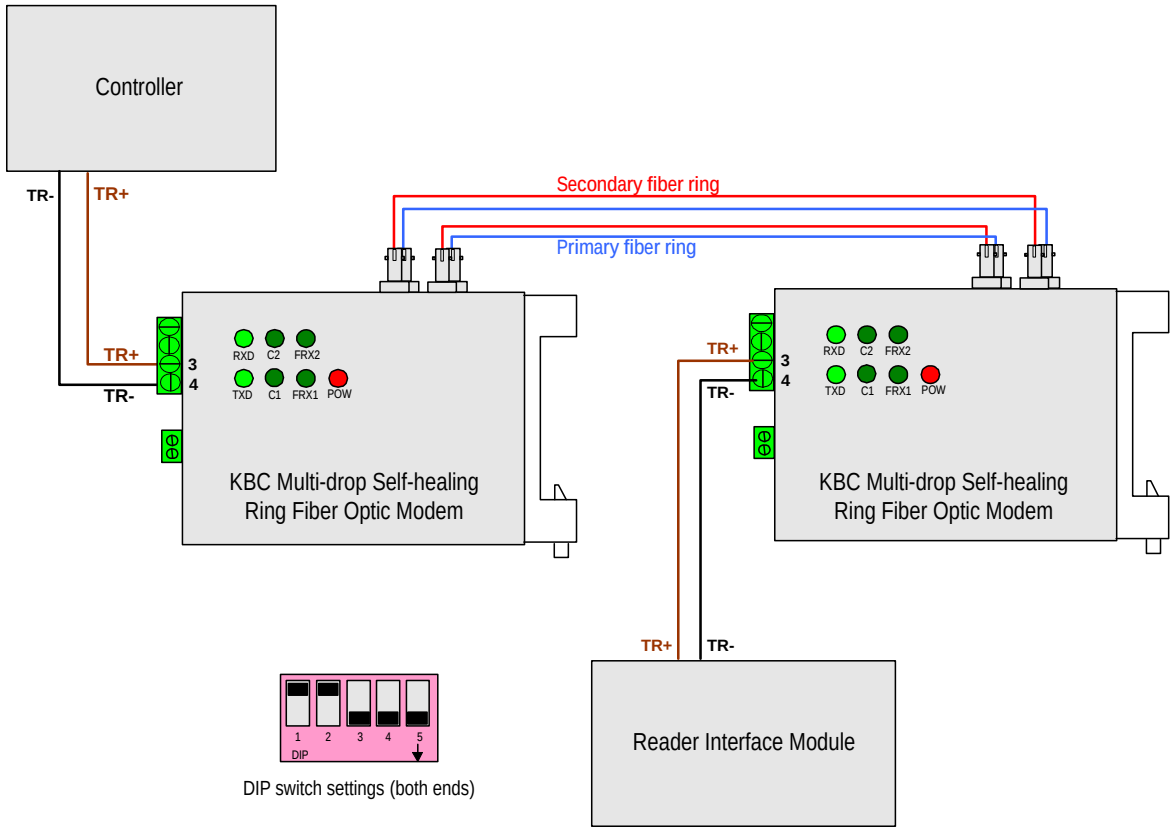
1. Connect to the modem using a terminal program, such as HyperTerminal.
2. Type `AT&F0` to restore factory configuration 1.
3. Type `ATE0&D0&W0` to disable the command echo, override DTR, and store these settings to profile 0.
4. Disconnect from the modem and exit the terminal program.

For more information, refer to the Securcomm Uniflex modem operating instructions and programming manual.

33.15 KBC Fiber Optic Modem

33.15.1 Wiring for Fiber Optic Communication

The following wiring method uses the KBC fiber optic modem (part number FTDR-M2-WSA). This diagram shows wiring downstream devices off the ISC. This specific diagram is connecting the Reader Interface Module to the ISC.



33.16 Comtrol RocketPort Hub Si

Three RocketPort Serial Hubs are supported. They are LAN attached serial hubs, using DB9 connectors.

The two-port hub has 10/100base-T input, with two selectable output ports. It is certified for up to eight ISCs on each of the two downstream ports in an RS-485 configuration.

The four-port hub has a 10base-T only input, with four selectable output ports (RS-232, RS-422, or RS-485). It is certified for a maximum of 16 ISCs on each RocketPort hub.

The eight-port hub has a 10base-T only input, with eight selectable output ports (RS-232, RS-422, or RS-485). It is certified for a maximum of 16 ISCs on each RocketPort hub.

33.16.1 RocketPort Hub Settings

Note: These settings can be modified in Device Manager.

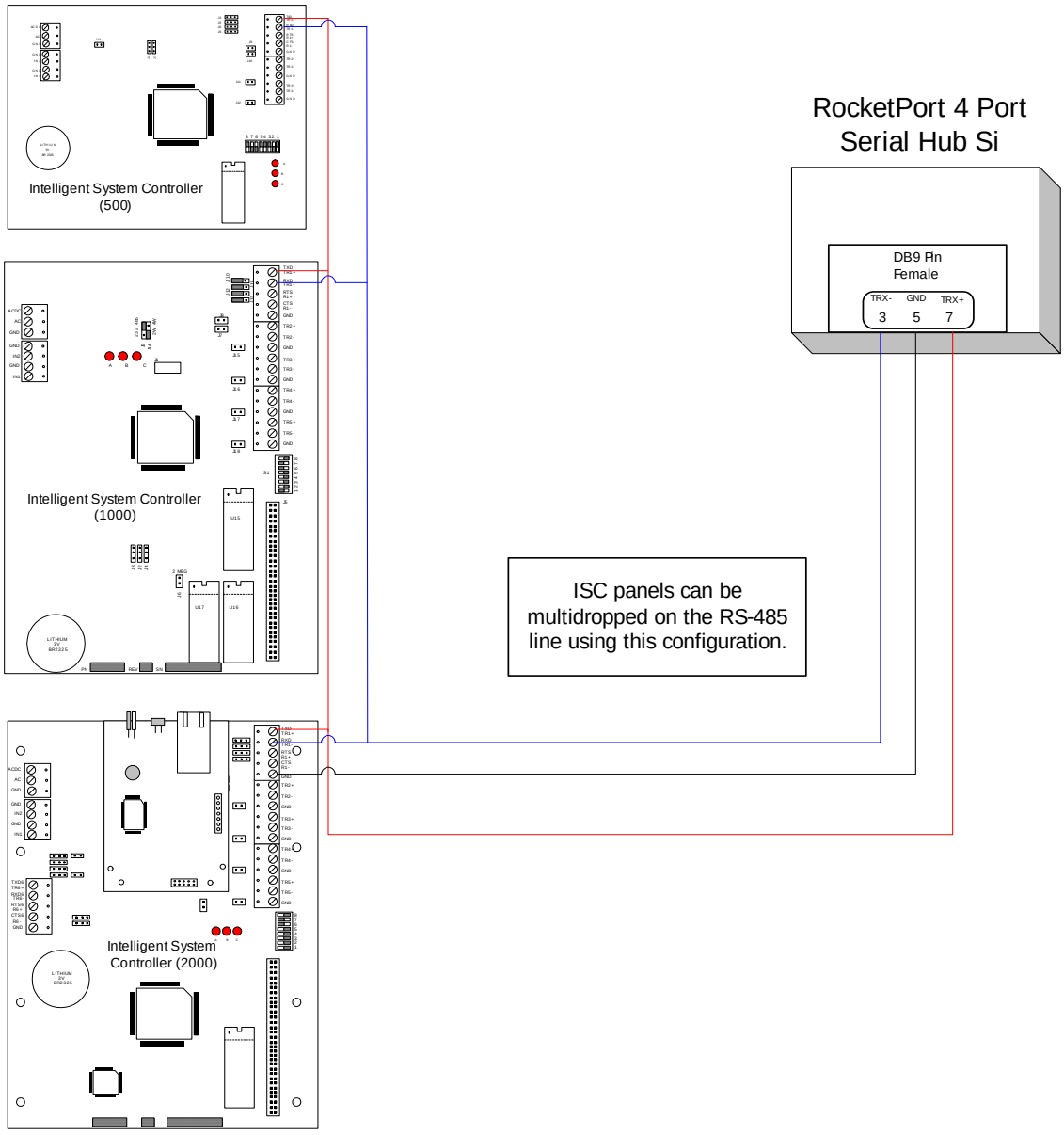
```
Port RS Mode = RS-485
Override and Lock Baud Rate To = None
Timeout on transmit data on port close = 1 sec.
Inactive Timeout Period = 120 sec.
Map 2 stop bits to 1 = Off
Wait on physical transmission before completing write = Off
Emulate modem hardware RING signal = Off
Override and lock to RTS toggle mode = Off
RTS Toggle RTS low = On
```

ISC:

```
Communications Interface Type = RS-485
RS-485 Type = 2-wire RS-485
Port 1 RS-485 EOL Terminations = LNL-2000 and LNL-500 termination set
to ON; LNL-1000 terminations turned OFF. For more information, please
refer to the ISC documentation.
```

33.16.2 Wiring the RocketPort Si Hub

Refer to the following diagram for wiring the RocketPort Si Hub to the ISC.



The PIN assignments are as follows:

Comtrol female DB-9 connector	**ISC**
Pin 3 (TRX-)	RXD
Pin 7 (TRX+)	TXD
Pin 5 (GND)	GND

ISC Settings

Jumper Settings

	LNL-500	LNL-1000	LNL-2000
Jumper 1	na	na	na
Jumper 2	na	512 K	na
Jumper 3	485	512 K	na
Jumper 4	485	512 K	485
Jumper 5	485	na	485
Jumper 6	485	not used	485
Jumper 7	2W	off	485
Jumper 8	ON	off	2W
Jumper 9	485	485	ON
Jumper 10	ON	485	485
Jumper 11	ON	485	ON
Jumper 12	ON	485	na
Jumper 13	ON	485	485
Jumper 14	na	2W	485
Jumper 15	na	ON	485
Jumper 16	na	ON	485
Jumper 17	na	ON	2W
Jumper 18	na	ON	ON
Jumper 19	na	na	485
Jumper 20	na	na	ON
Jumper 21	na	na	ON
Jumper 22	na	na	ON
Jumper 23	na	na	ON
Jumper 24	na	na	ON
Jumper 25	na	na	2-3
Jumper 26	na	na	ON

DIP Switch Settings

DIP switch	LNL-500	LNL-1000	LNL-2000
1	off	ON	off
2	ON	off	off
3	off	off	off
4	off	off	off
5	off	off	off
6	ON	ON	ON
7	ON	ON	ON
8	off	off	off

Address	2	1	0
Baud	38400	38400	38400

33.16.3 RocketPort Driver

Be sure to install the driver for the RocketPort Si Hub from Comtrol. When finished, you will need to restart the computer.

33.16.4 Configuring the RocketPort Hub

Configure the RocketPort

1. Turn on the RocketPort.
2. In the Device Manager, expand Multi-port serial adapters. Right-click the RocketPort Serial Hub port and select **Properties**.
3. On the Main Setup tab, select the RocketPort Serial Hub Si Port and click [Properties].
4. Click on the Device tab. In the Device Window, notice that the MAXC address is incomplete.
5. Enter the MAC address as found on the bottom of the Comtrol unit. Click [OK].
6. Click [OK] for the Properties window.
7. Restart the computer.

Configure the IP Address

1. In the Device Manager, expand Multi-port serial adapters. Right-click the RocketPort Serial Hub port and select **Properties**. On the Advisor tab, the summary box should say “Uninitialized.”

2. Click on the IP Programming tab.
3. In the Device Control Box, click [Retrieve]. A confirmation message will be displayed. Click [OK] to populate the TCP/IP setting field boxes.
4. Click [Program]. A confirmation message will be displayed. Click [OK] to begin programming the device.
5. The unit must be reset. Click [Reset] and the unit programming will be completed.
6. Restart the computer.

Configure Ports

1. In the Device Manager, expand Multi-port serial adapters. Right-click the RocketPort Serial Hub port and select **Properties**.
2. On the Main Setup tab, select the port being used for communication and click [Properties].
3. For RS-485 2-wire communication, use the following settings:

Port Setup	
RS mode:	485
Override and lock baud rate to:	None
Timeout on transmit data on port close:	0 sec
Inactive Timeout Period:	120 sec
Map 2 stop bits to 1	unchecked
Wait on physical transmission before completing write	unchecked
Emulate modem hardware TRING signal	unchecked
COM name:	Select appropriate name

4. On the RTS Toggle tab, select **RTS Toggle RTS Low**.
5. Click [OK].

LNL-1100 INPUT CONTROL MODULE

34 Overview of the LNL-1100

The Input Control Module (ICM) provides the access control system with high-speed acknowledgment of critical alarm points in monitored areas. It has sixteen configurable input control points and two output control relays. The ICM supports normally open, normally closed, supervised and non-supervised circuits.

The input circuits are scanned at a rate of sixty (60) times per second, with a debounce timing of 64 mS. The digitized input status signal is software monitored and controlled, resulting in the ability for each input point to be programmed as a supervised or non-supervised alarm point, normally open or normally closed monitoring point.

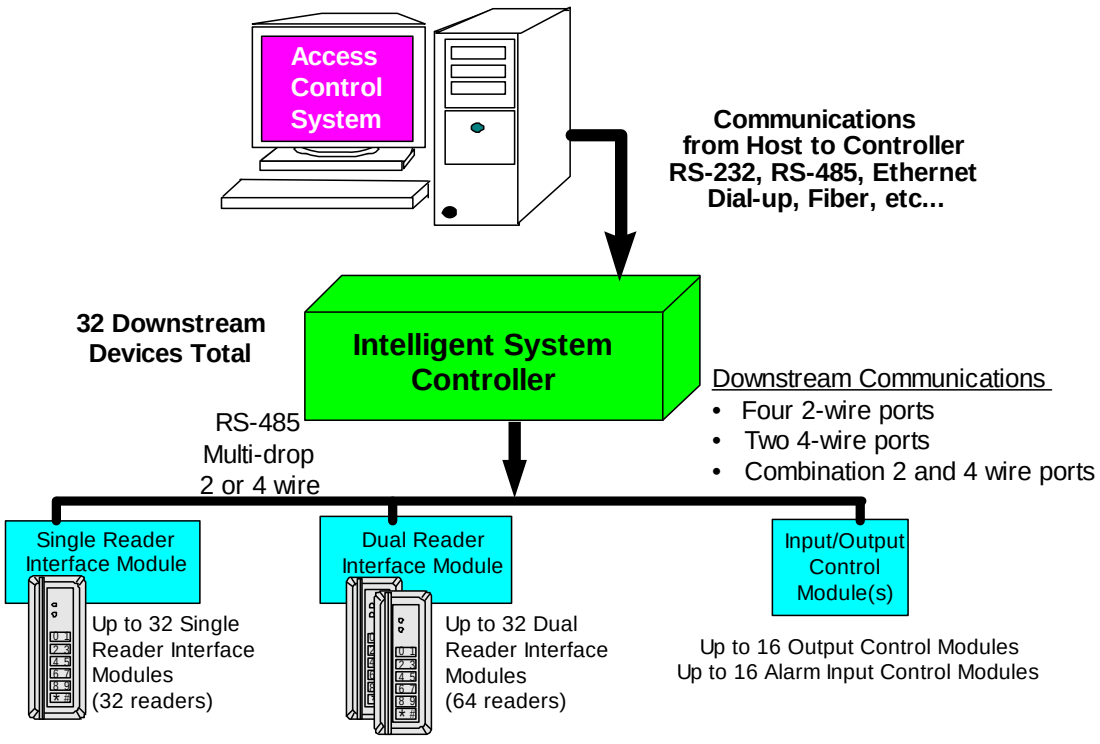
The output relays can also be configured for fail-safe or fail-secure. The relays support “On,” “Off,” and “Pulse” controls.

The series 2 board differs slightly from the series 1 boards. Where series 2 is indicated, the information only applies to series 2 boards. Otherwise, the information applies to both series 1 and 2 boards.

34.1 Interfaces

The Input Control Module interfaces upstream with the Intelligent System Controller.

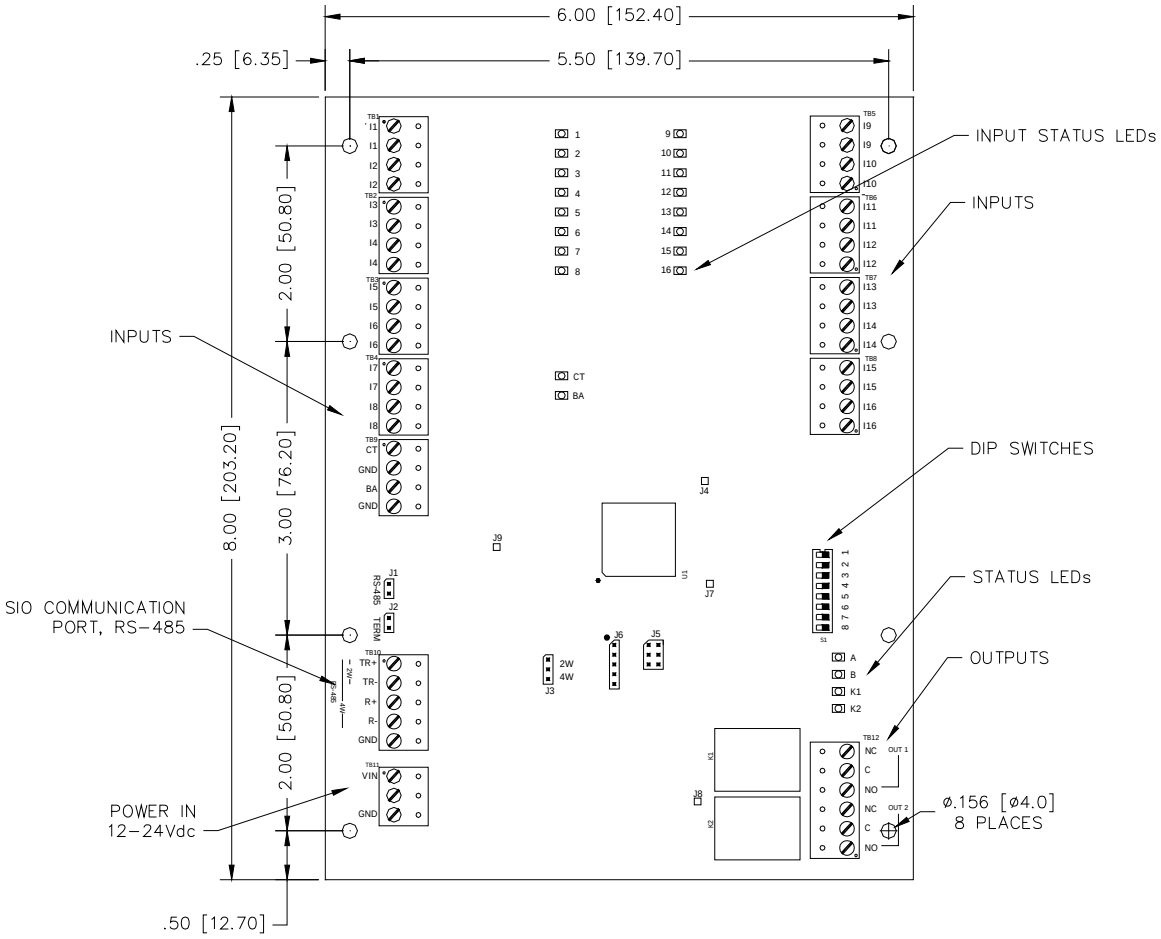
Intelligent System Controller Communications Overview


Access Control System
Communications from Host to Controller
RS-232, RS-485, Ethernet
Dial-up, Fiber, etc...
32 Downstream Devices Total
Intelligent System Controller
Downstream Communications
• Four 2-wire ports
• Two 4-wire ports
• Combination 2 and 4 wire ports
RS-485
Multi-drop
2 or 4 wire
Single Reader Interface Module
Up to 32 Single Reader Interface Modules (32 readers)
Dual Reader Interface Module
Up to 32 Dual Reader Interface Modules (64 readers)
Input/Output Control Module(s)
Up to 16 Output Control Modules
Up to 16 Alarm Input Control Modules

34.2 The Input Control Module (Series 2)

The series 2 Input Control Module board contains the following components: sixteen (16) software configurable alarm inputs, two (2) non-supervised alarm inputs, two (2) alarm output relays, one (1) RS-485 interface, one (1) power input, eight (8) DIP switches, jumpers, and status LEDs.

Input Control Module



34.2.1 Status LEDs

The series 2 Input Control Module contains LEDs that can be used to verify correct installation after power up.

Power-up: All LED's OFF.

Initialization: Once power is applied, initialization of the module begins.

The A LED is turned on at the beginning of initialization. If the application program cannot be run, the A LED will flash at a rapid rate. The MR-16IN is waiting for firmware to be downloaded.

When initialization is completed, LEDs 1 through 16, CT and BA are briefly sequenced ON then OFF.

Run time: After the above sequence, the LEDs have the following meanings:

A LED: Heartbeat and On-Line Status:

- Off-line: 1 second rate, 20% ON
- On-line: 1 second rate, 80% ON

B LED: Communication Port Status:

- Indicates communication activity on the communication port

1 LED: Input Status: 1
2 LED: Input Status: 2
3 LED: Input Status: 3
4 LED: Input Status: 4
5 LED: Input Status: 5
6 LED: Input Status: 6
7 LED: Input Status: 7
8 LED: Input Status: 8
9 LED: Input Status: 9
10 LED: Input Status: 10
11 LED: Input Status: 11
12 LED: Input Status: 12
13 LED: Input Status: 13
14 LED: Input Status: 14
15 LED: Input Status: 15
16 LED: Input Status: 16
CT: Cabinet Tamper
BA: Power Fault

Input in the inactive state: OFF (briefly flashes ON every 3 seconds)

Input in the active state: ON (briefly flashes OFF every 3 seconds)

Input in a fault state: Rapid Flash

LED K1 and K2: correspond to output relay RLY 1 (K1) or RLY 2 (K2) is energized.

34.2.2 Series 1 and Series 2

The following tables list the differences between series 1 and series 2 hardware.

Input Control Module

Feature	Series 1	Series 2
Serial number	less than 540,000	540,000 or greater (revision D)
Input power	12 VDC ±10% or 12 VAC ±15%	12 to 24 VDC ±10%
ISC communication	2-wire or 4-wire RS-485	2-wire RS-485 only
Status LEDs	2 for board status	2 for board status, 16 for input status, 2 for output relay status, 2 for tamper/power fault status

35 Installation

To install the Input Control Module, perform the installation procedures described in the following sections, in the order in which they are presented.

35.1 Wiring

1. Wire the non-supervised alarm inputs for power fault and cabinet tamper monitoring.
2. Wire the software configurable alarm inputs.
3. Wire the upstream host communication.
4. Wire the relay outputs.
5. Wire the power input.

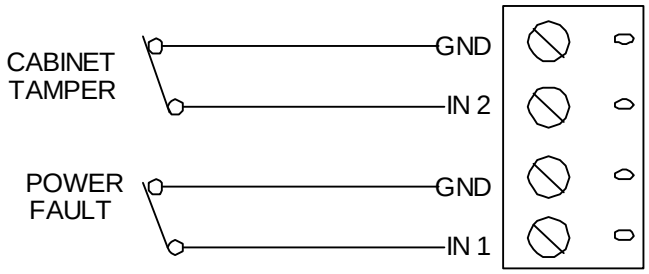
35.1.1 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

The Input Control Module features two non-supervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the BA (power fault) and CT (cabinet tamper) contact terminals on the Input Control Module board.

The BA and CT inputs are simple N/C (normally closed) contact closure monitors.

Wire the BA and CT inputs using twisted pair cable, 30 ohms maximum. (No EOL resistors are required.)

Non-supervised Alarm Input Wiring (BA and CT contacts.)



Note: If either of these inputs is not used, a shorting wire should be installed.

35.1.2 Software Configurable Alarm Inputs

The Input Control Module contains sixteen (16) software configurable alarm inputs that can be used for alarm device monitoring. Each of these inputs can be configured, via the Access Control software, as either N/O (normally open) or N/C (normally closed) in combination with either supervised or non-supervised wiring.

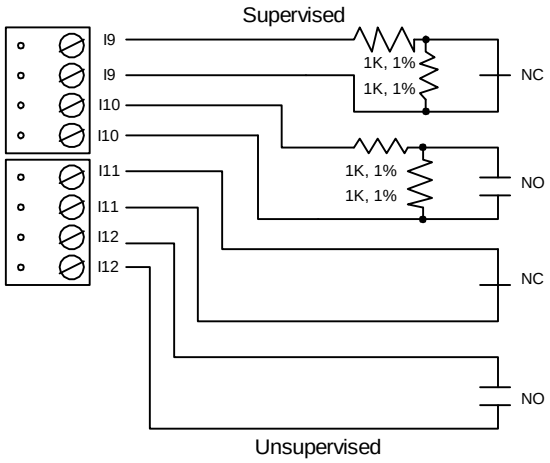
These alarm inputs are connected using Inputs 1-16.

Wire the Inputs 1-16 contacts using twisted pair cable, 30 ohms maximum, 24 AWG minimum. The gauge of the wire may vary, depending on distance and line resistance.

Each input that is configured as a supervised alarm must also be terminated with two (2) 1000-ohm resistors (1% tolerance - 0.25 watt. N/O and N/C alarms are terminated identically).

	Alarm Zone Contact N/C	Alarm Zone Contact N/O
Normal	1K ± 25%	2K ± 25%
Alarm	2K ± 25%	1K ± 25%
Fault – Line Short	0 – 50	0 – 50
Fault – Line Open	15K – ∞	15K – ∞
Fault – Foreign Voltage	50 – 750 1250 – 1500 2500 – 15K	50 – 750 1250 – 1500 2500 – 15K

Software Configurable Alarm Input Wiring (Inputs 1-16)



35.1.3 Upstream Controller Communication

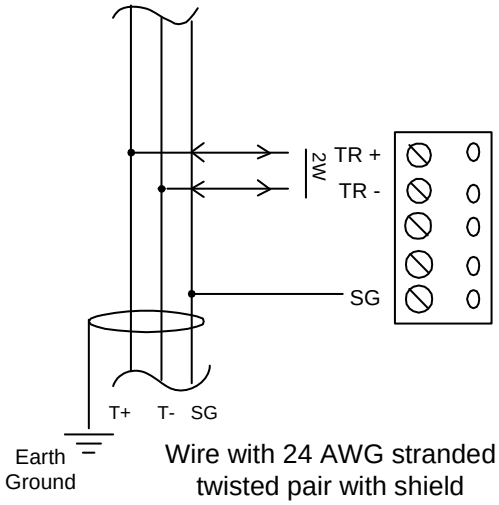
The Input Control Module uses Port 1 to communicate to the Intelligent System Controller.

Port 1 is an RS-485 interface that requires the following type of RS-485 cable: 24 AWG (minimum) twisted pair (with shields). Either 2-wire or 4-wire RS-485 cable configuration can be used for series 1. Only 2-wire RS-485 cable configuration can be used for series 2. The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842, West Penn, or equivalent). The drop cables (to readers and other devices) should be kept as short as possible, no longer than Ten (10) feet (Belden 9502 or equivalent).

The RS-485 communication is asynchronous, half-duplex, using 1 start bit, 8 data bits, 1 stop bit.

LNL-1100 series 2 upstream controller communication wiring: 2-wire (port 1)

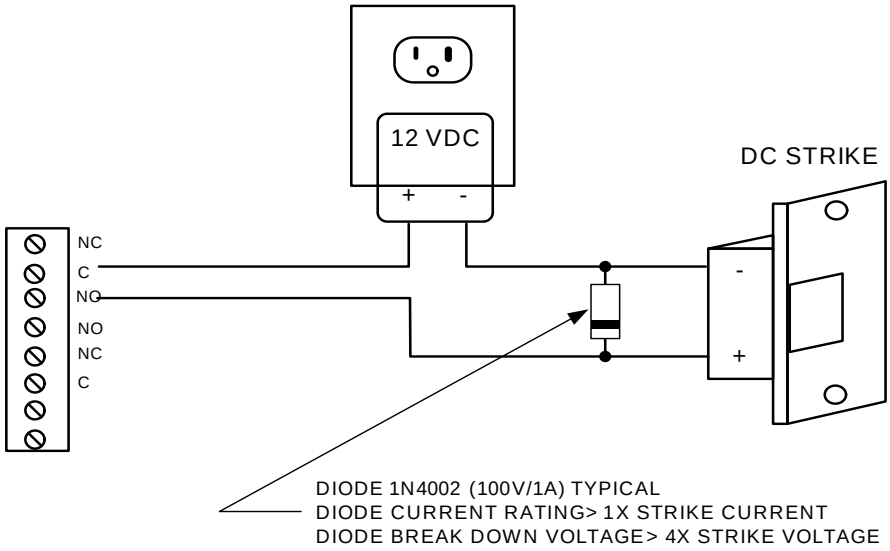
RS-485 2-WIRE COMMUNICATIONS

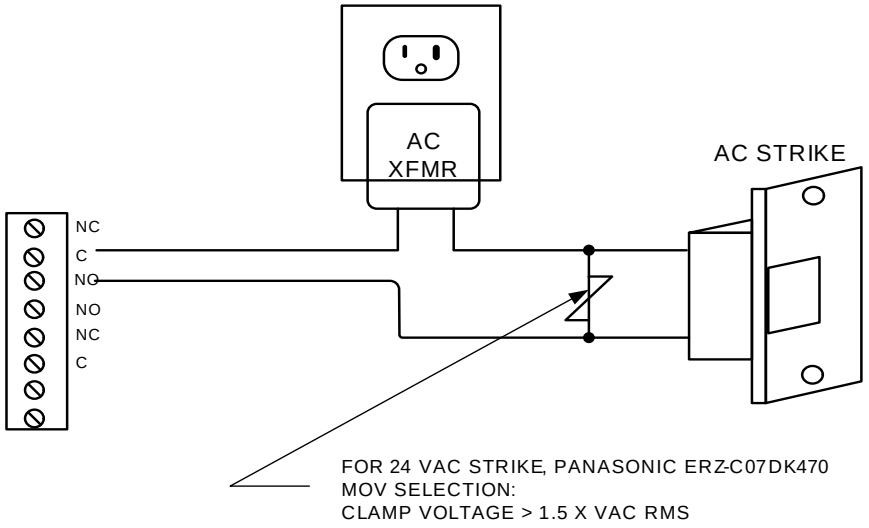


35.1.4 Relay Outputs

Two form-C contact relays are provided for controlling door strikes or other devices. Load switching can cause abnormal contact wear and premature contact failure. Switching of inductive loads (strike) also causes EMI (electromagnetic interference) which may interfere with normal operation of other equipment. To minimize premature contact failure and to increase system reliability, contact protection circuit must be used. The following two circuits are recommended. Locate the protection circuit as close to the load as possible (within 12 inches [30cm]), as the effectiveness of the circuit will decrease if it is located further away.

Use sufficiently large gauge of wires for the load current as to avoid voltage loss.



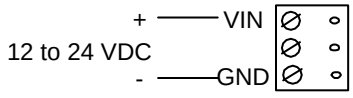


35.1.5 Power

For the LNL-1100 series 2, the power source should be located as close to module as possible.

Wire the power input with an 18 AWG (minimum) twisted pair cable.

Note: Be sure to observe polarity.



35.2 Elevator Control

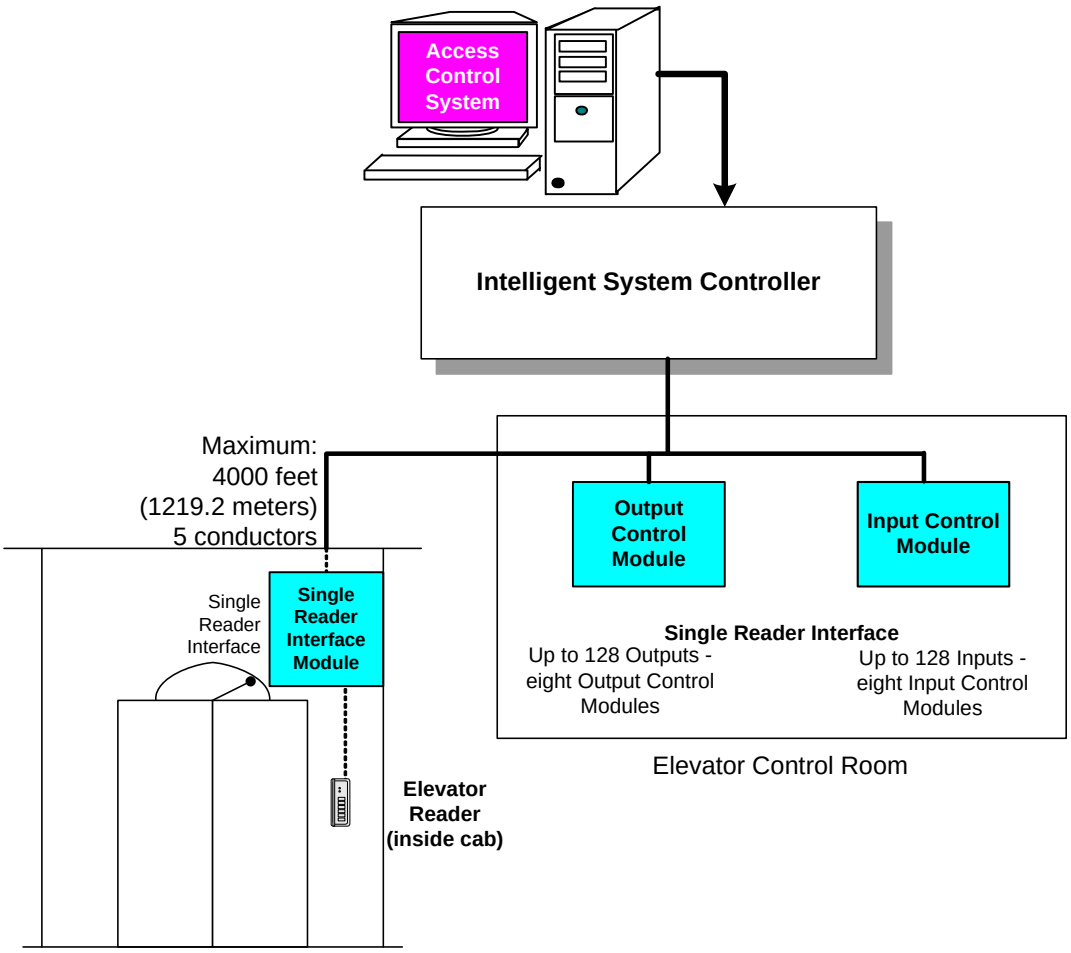
OnGuard hardware is capable of supporting elevator control for up to 128 floors. An elevator reader has an input/output module that controls the access to floors via an elevator.

The application software must be configured for elevator control. This can be done on the Elevator Hardware tab in the Readers window of the System Administration software. The “Elevator” box should be checked. The reader’s type, name, port, address, access panel, can all be defined here.

With elevator control on the LNL-1300 reader, door strike and contact are not available, and REX (Request to EXit) has been disabled.

Addresses assigned to input/output panels do not have to be consecutive. On the first panel, the inputs/outputs represent the first sixteen floors (e.g.: Input 1 = first floor, Input 2 = second floor, etc.). The second panel represents the next sixteen floors (floor 17 through 32), etc.

Overview of Elevator Control

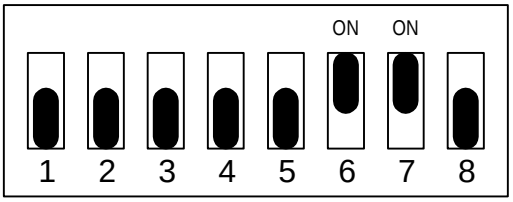


36 Configuration

The Input Control Module board contains 8 DIP switches and 3 jumpers that must be configured for your system.

36.1 Setting DIP Switches

DIP Switches (shown in factory default positions: Address 00; 38400 bps)



The following chart describes the use of each DIP switch.

DIP SWITCH(ES)	USED TO CONFIGURE:
1, 2, 3, 4, 5	Device communication address (0 - 31)
6, 7	Communication baud rate
8	Downstream encryption (available with OnGuard 2009 or later)

36.1.1 Device Address

To configure the device communication address, set DIP switches 1, 2, 3, 4, and 5 according to the following table.

ADDRESS	DIP SWITCH				
	1:	2:	3:	4:	5:
0	off	off	off	off	off
1	ON	off	off	off	off
2	off	ON	off	off	off
3	ON	ON	off	off	off
4	off	off	ON	off	off
5	ON	off	ON	off	off
6	off	ON	ON	off	off
7	ON	ON	ON	off	off
8	off	off	off	ON	off

ADDRESS	DIP SWITCH				
	1:	2:	3:	4:	5:
9	ON	off	off	ON	off
10	off	ON	off	ON	off
11	ON	ON	off	ON	off
12	off	off	ON	ON	off
13	ON	off	ON	ON	off
14	off	ON	ON	ON	off
15	ON	ON	ON	ON	off
16	off	off	off	off	ON
17	ON	off	off	off	ON
18	off	ON	off	off	ON
19	ON	ON	off	off	ON
20	off	off	ON	off	ON
21	ON	off	ON	off	ON
22	off	ON	ON	off	ON
23	ON	ON	ON	off	ON
24	off	off	off	ON	ON
25	ON	off	off	ON	ON
26	off	ON	off	ON	ON
27	ON	ON	off	ON	ON
28	off	off	ON	ON	ON
29	ON	off	ON	ON	ON
30	off	ON	ON	ON	ON
31	ON	ON	ON	ON	ON

36.1.2 Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table.

BAUD RATE:	DIP SWITCH	
	6:	7:
38,400 bps	ON	ON
19,200 bps	off	ON

BAUD RATE:	DIP SWITCH	
	6:	7:
9600 bps	ON	off
11,5200 bps	off	off

Currently, OnGuard only supports a baud rate of 38400 bps, so be sure to set both DIP switches 6 and 7 to the ON position.

36.1.3 Communication Password Status

DIP switch 8 controls the utilization of encryption.

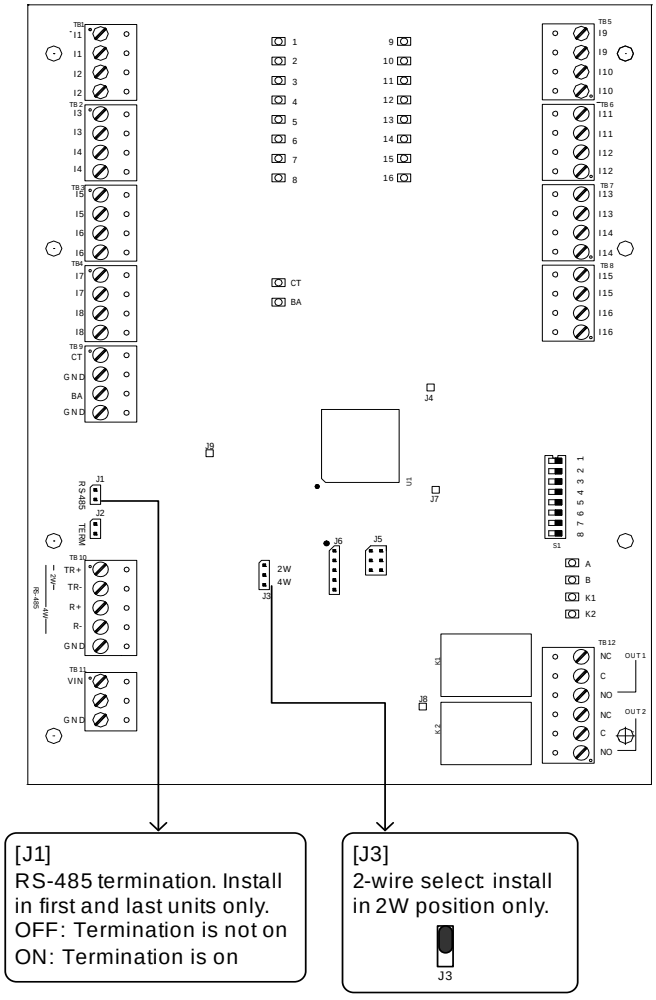
PASSWORD STATUS	DIP SWITCH 8: (OnGuard 2009 or later)	DIP SWITCH 8: (prior to OnGuard 2009)
Encryption is optional	off	Normal operation
Encryption is required	ON	Not allowed

When DIP switch 8 is ON, communication will not be allowed unless the access panel supports downstream encryption and is configured to enable encryption to this device.

When DIP switch 8 is off, the device will accept either encrypted or unencrypted communication. It must be off if the access panel does not support downstream encryption, or if downstream encryption is disabled for this device.

36.2 Installing Jumpers

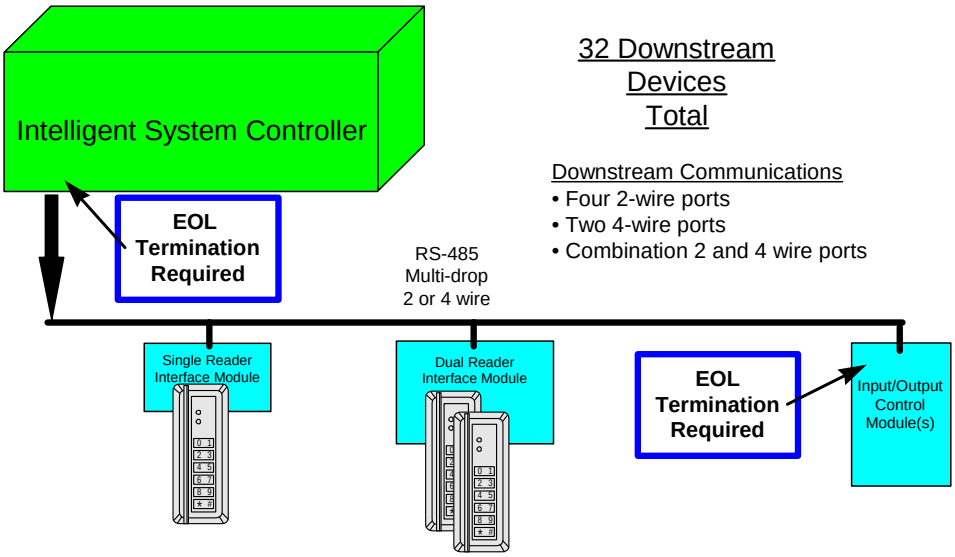
The following diagram describes the use of each jumper on the board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.


[J1]
RS-485 termination. Install in first and last units only.
OFF: Termination is not on
ON: Termination is on
[J3]
2-wire select install in 2W position only.
J3

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distances (4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances, End-Of-Line (EOL) termination is required.

RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has an on-board terminator. The installer should determine which device is at the end of the communication line.

EOL Termination



37 Specifications

**The LNL-1100 series 2 is for use in low voltage, class 2 circuits only. These specifications are subject to change without notice.

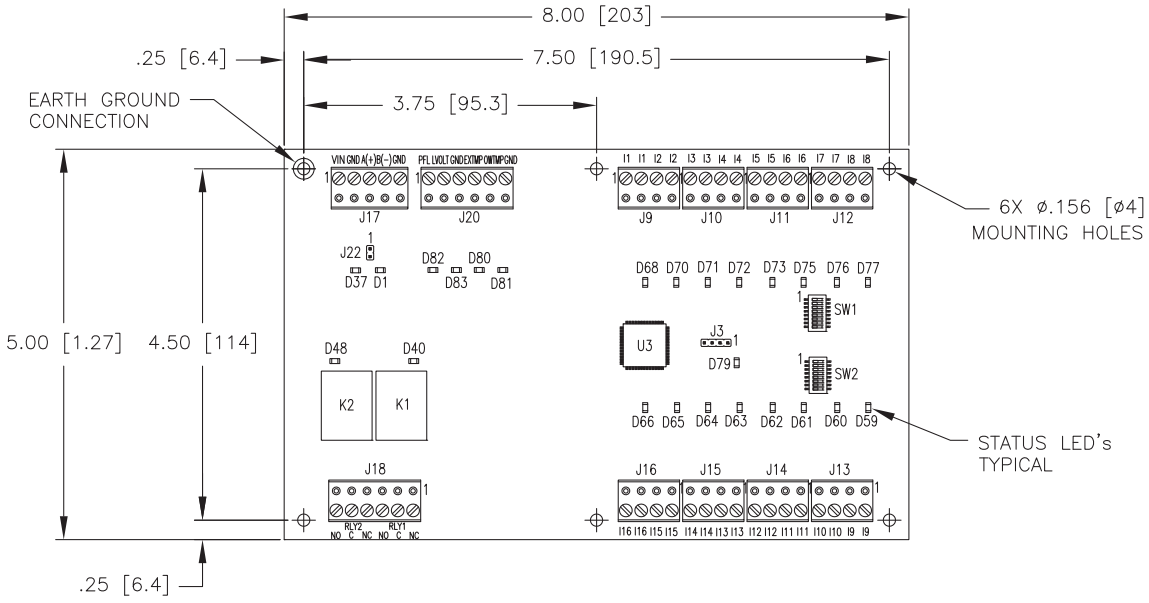
- Primary power: 12 to 24 VDC ± 10%, 350mA maximum
  - 12 VDC @ 300 mA nominal
  - 24 VDC @ 220 mA nominal
- Output: Two (2) outputs, Form-C, 5A @ 28 VDC resistive
- Inputs:
  - Sixteen (16) unsupervised/supervised, standard EOL: 1k/1k ohm, 1%, 1/4 watt
  - Two (2) unsupervised, dedicated for cabinet tamper and UPS fault monitoring
- Communication: RS-485, 2-wire, 9600 to 115,200 bps
- Cable requirements:
  - Power: 18 AWG, 1stranded twisted pair
  - RS-485: 24 AWG, 120 ohm impedance, stranded twisted pair with shield, 4000 feet (1219 m) maximum
  - Alarm inputs: 1 stranded twisted pair, 30 ohms maximum
  - Outputs: as required for the load
- Mechanical:
  - Dimension: 6 x 8 x 1 in. (152 x 203 x 25 mm)
  - Weight: 9 oz. (280 g) nominal
- Environmental:
  - Temperature: -55 to +85° C storage, 0 to +70° C operating
  - Humidity: 0 to 95% RHNC
- Certifications:
  - UL294 & UL1076 Listed
  - ULC Listed
  - FCC Part 15
  - C-Tick
  - CE marking
  - RoHS compliant
  - WEEE

LNL-1100-U INPUT CONTROL MODULE

38 Overview of the LNL-1100-U Board

The Input Control Module (ICM) board contains the following components: sixteen (16) software configurable alarm inputs, two (2) unsupervised alarm inputs, two (2) alarm output relays, one (1) RS-485 interface, power input, DIP switches, and jumpers.

ICM board (Dimensions are in inches [mm])



38.1 Package Contents

- LNL-1100-U board
- 1000 ohm resistors

39 Installation

To install the Input Control Module (ICM), perform the installation procedures described in the following sections, in the order in which they are presented.

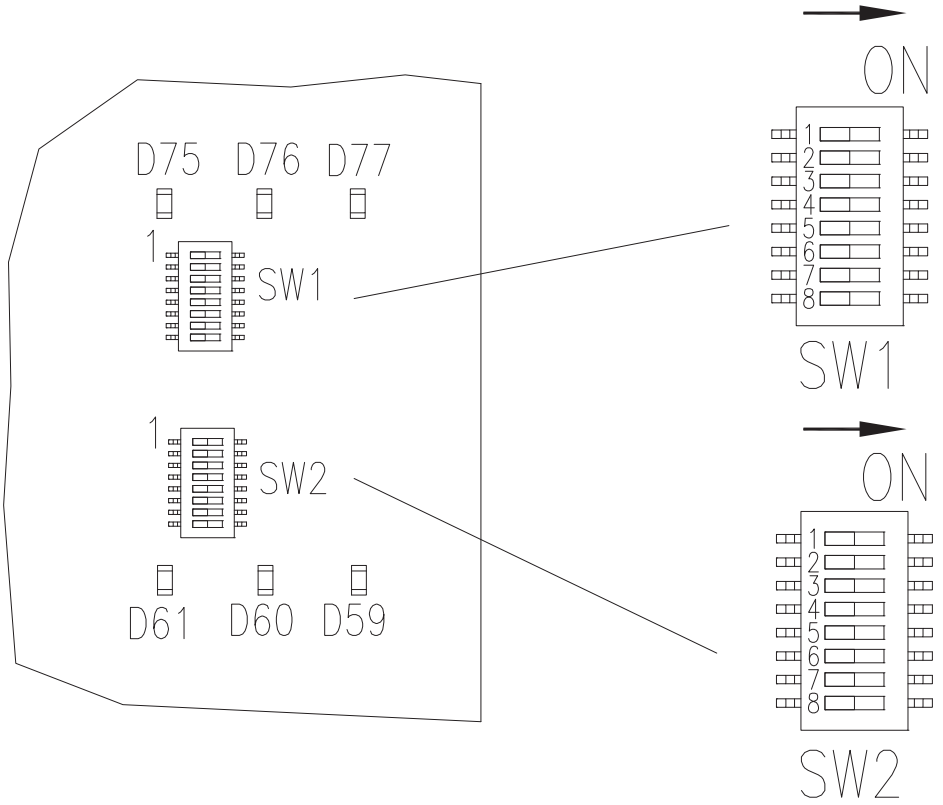
1. Set baud rate (SW1), address (SW2), and LED control switches.
2. Install jumpers.
3. Mount the board in the enclosure.
4. Wire the unsupervised alarm inputs for power fault and cabinet tamper.
5. Wire the supervised alarm inputs.
6. Wire the upstream host communication.
7. Wire the relay outputs.
8. Wire the power and communications inputs.
9. Validate proper operation on power up.

40 Configuration

The Input Control Module board contains two (2) 8-position DIP switches that are user-selectable to control addressing, baud rate, and other user functions, and one (1) RS-485 termination jumper used to configure the system.

40.1 Setting DIP Switches

ICM dip switches



40.1.1 Communication Baud Rate (SW1)

Configure the baud rate using SW1 switches 1-4. (Switch 5 is used for LED control. Switches 6-8 are not used.)

Baud rate	SW1 switch for host		SW1 switch for OSDP readers (Aux ports)	
	1:	2:	3:	4:
2400 bps	off	off	off	off
9600 bps	ON	off	ON	off
19200 bps	off	ON	off	ON

Baud rate	SW1 switch for host		SW1 switch for OSDP readers (Aux ports)	
	1:	2:	3:	4:
38400 bps	ON	ON	ON	ON

LED Mode

SW1 switch 5 is used for LED control. It is read at boot time. If you make a change to this setting, be sure to restart.

SW1 Switch 5	State
ON	LEDs behave as the Access (LNL) series module.
off	LED behavior is in Normal Mode

40.1.2 Device Address (SW2)

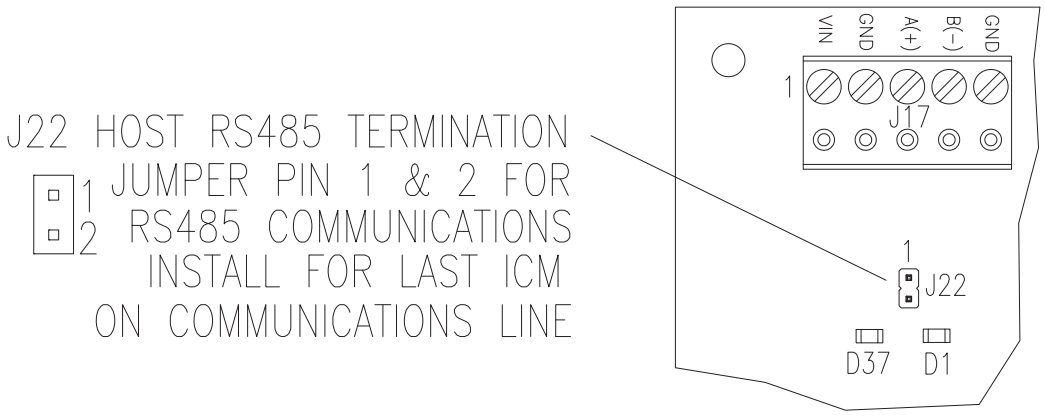
Configure the board address using SW2. (Switches 6-8 are not used.)

Address	SW2 switch				
	1:	2:	3:	4:	5:
0	off	off	off	off	off
1	ON	off	off	off	off
2	off	ON	off	off	off
3	ON	ON	off	off	off
4	off	off	ON	off	off
5	ON	off	ON	off	off
6	off	ON	ON	off	off
7	ON	ON	ON	off	off
8	off	off	off	ON	off
9	ON	off	off	ON	off
10	off	ON	off	ON	off
11	ON	ON	off	ON	off
12	off	off	ON	ON	off
13	ON	off	ON	ON	off
14	off	ON	ON	ON	off
15	ON	ON	ON	ON	off
16	off	off	off	off	ON

Address	SW2 switch				
	1:	2:	3:	4:	5:
17	ON	off	off	off	ON
18	off	ON	off	off	ON
19	ON	ON	off	off	ON
20	off	off	ON	off	ON
21	ON	off	ON	off	ON
22	off	ON	ON	off	ON
23	ON	ON	ON	off	ON
24	off	off	off	ON	ON
25	ON	off	off	ON	ON
26	off	ON	off	ON	ON
27	ON	ON	off	ON	ON
28	off	off	ON	ON	ON
29	ON	off	ON	ON	ON
30	off	ON	ON	ON	ON
31	ON	ON	ON	ON	ON

40.2 Installing Jumpers

Jumper configuration



Host Communications: Jumper J22 pins 1 & 2 for RS-485 communications termination. Install jumper on the last ICM on the communications line for proper termination of the communications bus. (For more information, refer to the ICM upstream wiring diagram on page 247.)

40.3 Status LEDs

40.3.1 LED Table for Series 2 LNL-1100 Mode

When switch 5 is in the ON position, the LEDs behave like the series 2 LNL-1100.

Indication	LED	State
Power-up	ALL	Off
Initialization	D79	Flashing
After initialization	D79	Offline: 1 second rate, 20% ON Online: 1 second rate, 80% ON
Communications	D1	ON

40.3.2 LED Table for Normal Mode

When SW1 switch 5 is in the off position, the LEDs operate in Normal Mode.

External tamper (cabinet tamper) must be open for Input LEDs to be on. When tamper is closed (cabinet door closed) Input LEDs will be off.

Indication	LED	State
RS-485 panel communication	D1	ON - Yellow
Power on	D37	ON - Green
Relay 1	D40	ON - Green
Relay 2	D48	ON - Green
Supervised input I1-I16	D59-66, D68, D70-D73, D75-D77	Active: ON - Yellow Inactive: ON - Green Foreign: ON - Red Cut: Flashing - Green Short: Flashing - Red Ground: Flashing - Yellow
Unsupervised I1-I16	D59-66, D68, D70-D73, D75-D77	Closed ON - Red, Open - Off
CPU status	D79	Offline: 1 second rate, 20% ON Online: 1 second rate, 80% ON
External (cabinet) tamper	D80	Open ON - Red
Power fail	D82	ON - Red

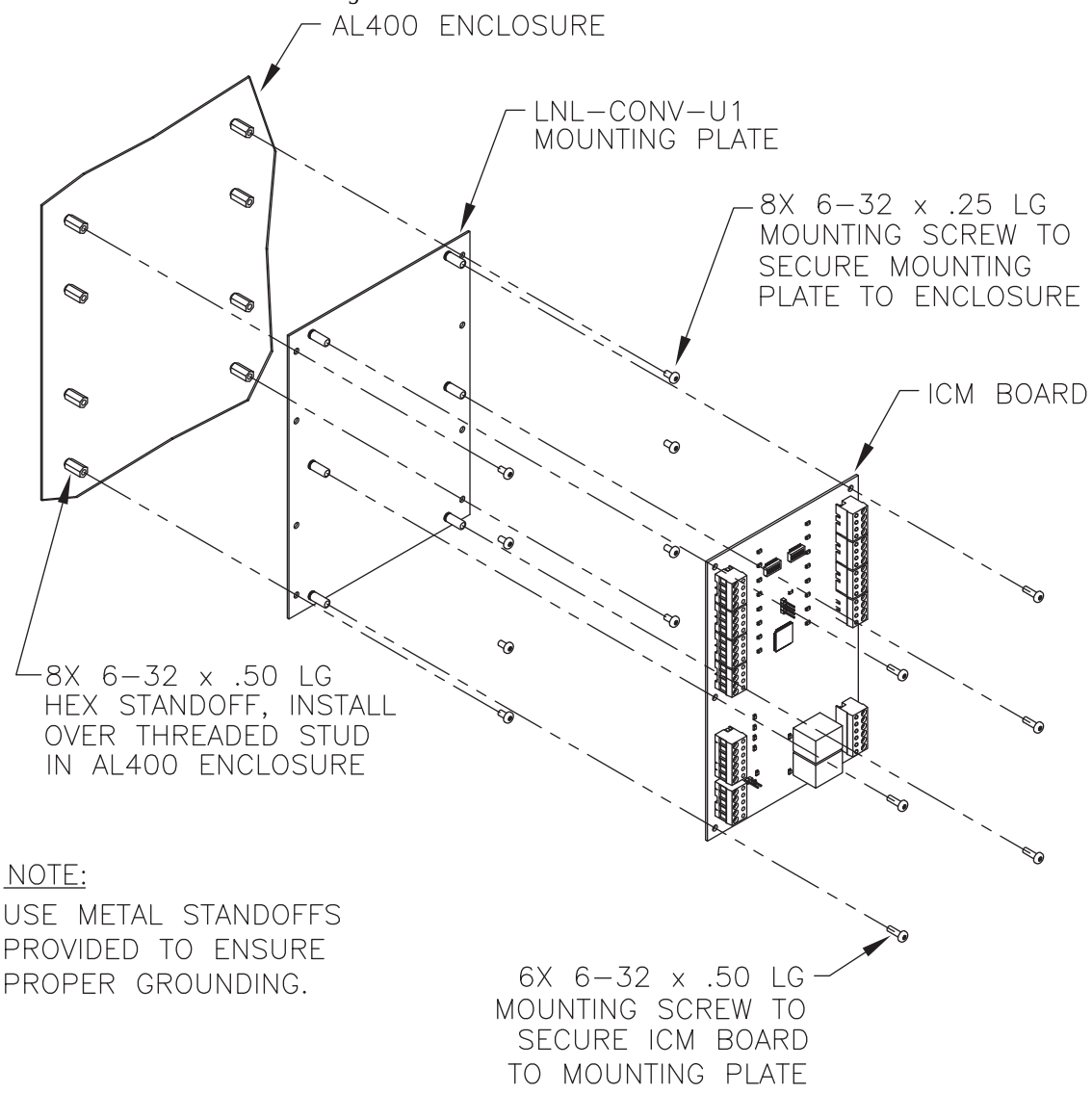
CPU status LED D79 possible module error conditions for LED Normal and Series 2 modes.

Error condition	Flashing pattern	Description
No valid application firmware	3 Red, 2 Green	The module is not operational. Firmware must be loaded using a console, e.g. HyperTerminal with Xmodem.
Boot loader waiting on firmware file	3 Red, 1 Green	Console boot loader is waiting on start of firmware file.
Boot loader loading firmware file	2 Red, 2 Green	Console boot loader is loading a firmware file.
Invalid EFL file	1 Red, 2 Green	The EFL specified to be loaded using the console loader is not a valid EFL file.
Invalid Xmodem packet	1 Red, 1 Green	The console loader received an invalid Xmodem packet and terminated the firmware download operation.
Invalid Application firmware for module CPU	3 Red, 0 Green	The module is not operational. Application firmware loaded on the module will not run properly. Requires new firmware be loaded using the console boot loader or the module must be returned for repair.
Invalid Boot firmware for module CPU	2 Red, 3 Green	The module is not operational. Boot loader firmware loaded on the module will not run properly. The module must be returned for repair.
Firmware update failed	1 Red, 3 Green	Firmware update operation was unsuccessful. Retry and if it fails continuously, load a different firmware file.
No valid primary firmware copy	3 Green, 2 Red	The firmware flash contains 2 copies of the application firmware. The primary copy is not valid so the backup copy will be loaded into the primary copy and executed.
No valid backup firmware copy	3 Green, 1 Red	The firmware flash contains 2 copies of the application firmware. The backup copy is not valid so the primary copy will be loaded into the backup copy.
No valid manufacturing parameters	3 Green, 0 Red	The manufacturing parameters which include the serial number, etc. are invalid. The module must be returned for repair.

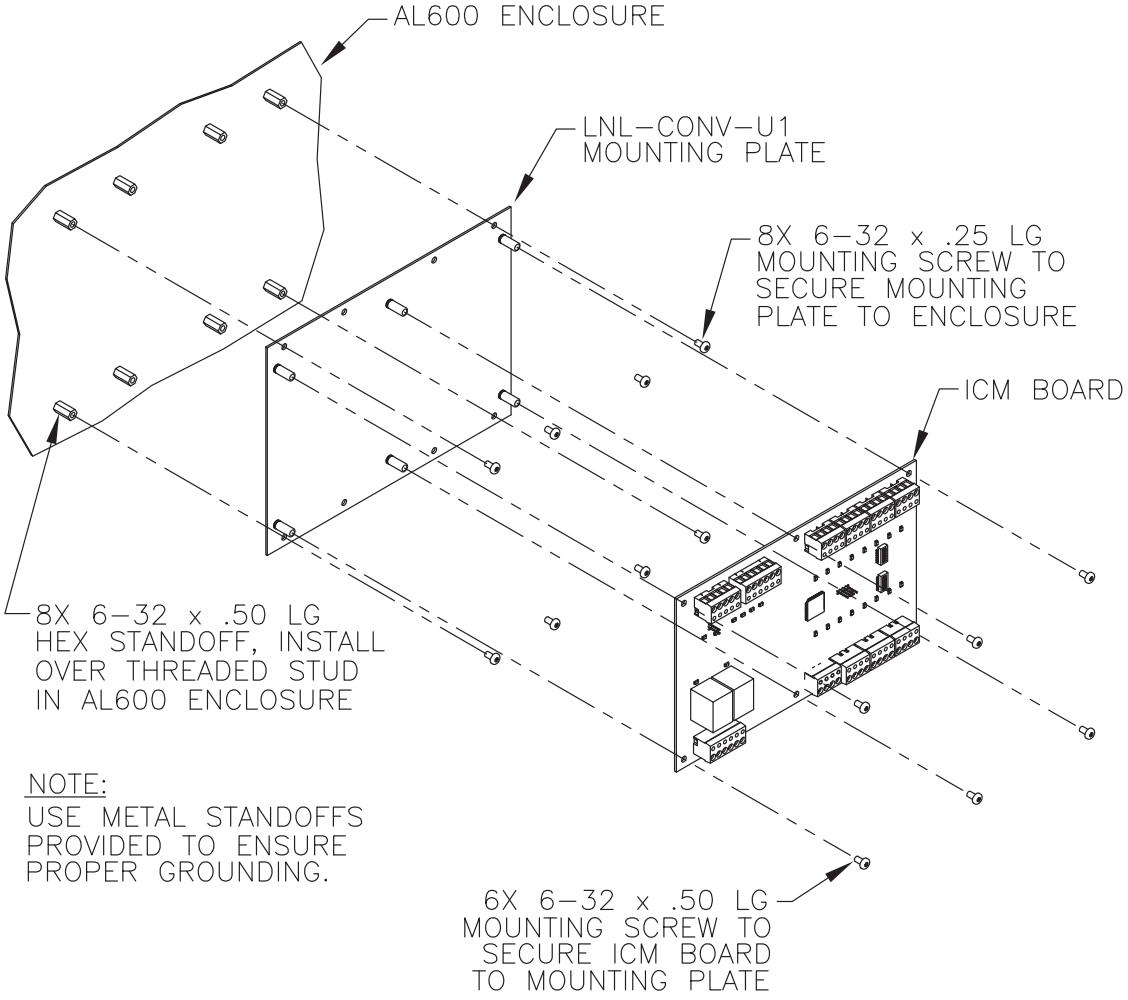
41 Mounting

The ICM can be mounted in the LNL-AL400ULX or LNL-AL600ULX-4CB6 and the LNL-CTX or LNL-CTX6 enclosure using the Universal Mounting Plate (UMP) LNL-CONV-U1.

Mounting the ICM in the LNL-AL400ULX and LNL-CTX



Mounting the ICM in the LNL-AL600ULX-4CB6 or LNL-CTX6

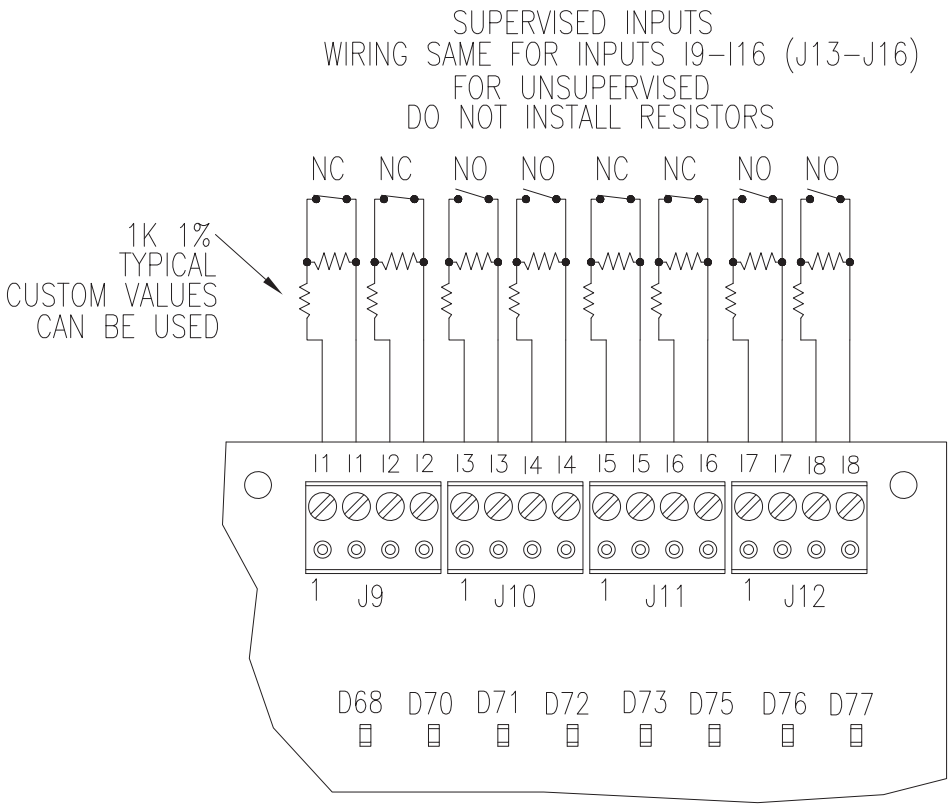


42 Wiring

Wire inputs I1 through I16 (J9 - J16) using a twisted pair cable, 30 ohms maximum, 24 AWG minimum.

Note: For UL installations, refer to section UL Listed Installations on page 250.

ICM input wiring


SUPERVISED INPUTS
WIRING SAME FOR INPUTS I9–I16 (J13–J16)
FOR UNSUPERVISED
DO NOT INSTALL RESISTORS
NC NC NO NO NC NC NO NO
1K 1%
TYPICAL
CUSTOM VALUES
CAN BE USED
I1 I1 I2 I2 I3 I3 I4 I4 I5 I5 I6 I6 I7 I7 I8 I8
1 J9
1 J10
1 J11
1 J12
D68 D70 D71 D72 D73 D75 D76 D77

Note: For termination resistor values, refer to the Input Resistor Table on page 245.

42.1 Supervised (Software Configurable) Alarm Inputs

The sixteen (16) inputs that are available on the ICM are software configurable alarm inputs that can be used for alarm device monitoring. Each of these inputs can be configured, via the Access Control software, as either N/O (normally open) or N/C (normally closed) in combination with either supervised or unsupervised wiring. These alarm inputs are connected using Inputs 1 - 16.

Each input that is configured as a supervised alarm must also be terminated with two (2) 1K (1000) ohm resistors (1% tolerance - 1/4 (0.25) watt. N/O and N/C alarms are terminated identically). Resistors are provided with the module.

Install the resistors as close to input device as possible. For cable length limitations, refer to the Specifications section on page 251.

Input Resistor Table

	Alarm Zone Contact NC	Alarm Zone Contact NO
Normal	1K ± 25%	2K ± 25%
Alarm	2K ± 25%	1K ± 25%
Fault - Line Short	0 - 50	0 - 50
Fault - Line Open	15K - ∞	15K - ∞
Fault - Foreign Voltage	50 -750 1250 -1500 2500 -15K	50 - 750 1250 - 1500 2500 -15K

42.2 Unsupervised Alarm Inputs: Power Fail and External (Cabinet) Tamper

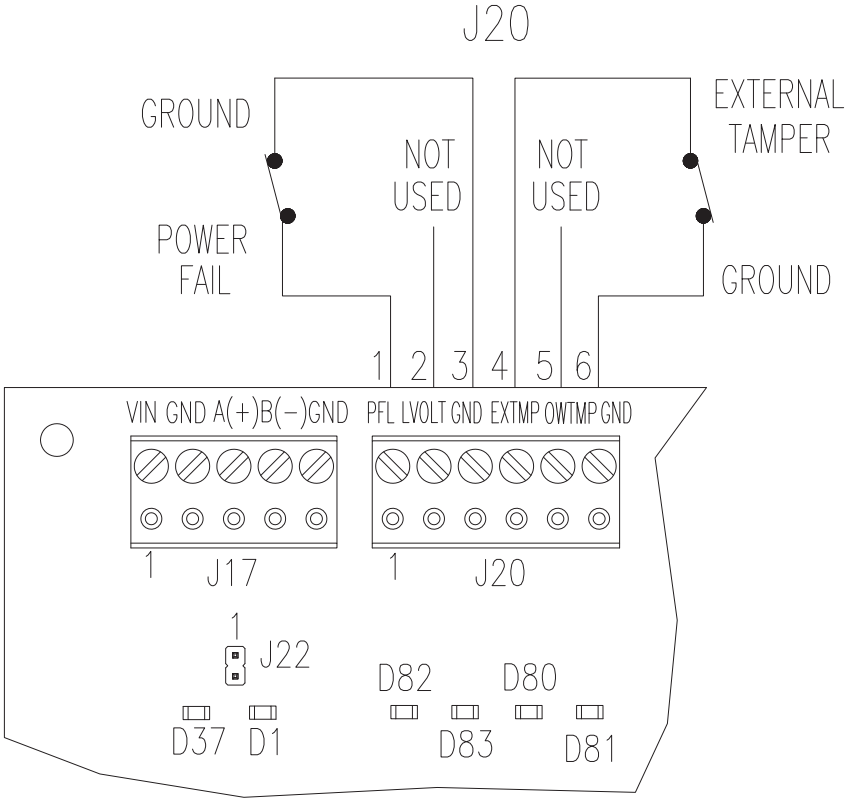
The Input Control Module features two (2) unsupervised alarm inputs that can be used for power fail and cabinet tamper monitoring. These inputs are connected using the PFL (power fail) and EXTMP (cabinet tamper) contact terminals on the Input Control Module board.

The PFL and EXTMP inputs are simple N/C (normally closed) contact closure monitors. Connect the power fail monitoring device to J20 pins 1 & 3 and to External Tamper (cabinet tamper) pins 4 & 6. If not used, a jumper must be installed across pins 1 & 3 and 4 & 6.

Note: Input Status LEDs will be off when the tamper device is in the closed position or the jumper is installed.

Wire the PFL and EXTMP inputs using twisted pair cable, 30 ohms maximum. (No EOL resistors are required.)

Unsupervised Alarm Input Wiring (Power Fail and External Tamper contacts)



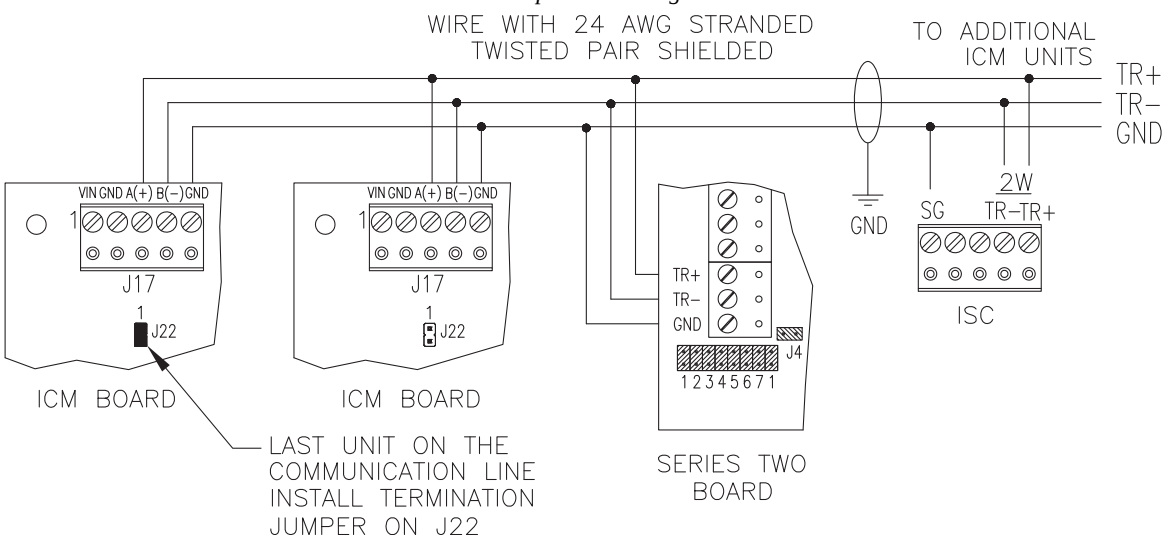
42.3 Upstream Controller Communication

The ICM uses Port 1 to communicate to the Intelligent System Controller.

Port 1 is a 2-wire RS-485 interface, that requires the following type of RS-485 cable: 24 AWG (minimum) twisted pair (with shields). The main run RS-485 cable should be no longer than 4000 feet [1219 m], 100 ohms maximum (Belden 9841, West Penn, or equivalent). The drop cables (to downstream devices) should be kept as short as possible, no longer than 10 feet [3.048 m].

The RS-485 communication is asynchronous, half-duplex, using 1 start bit, 8 data bits, 1 stop bit.

ICM upstream wiring



To enable RS-485 termination, install jumper on pin header J22 (on the last unit on the communication line).

Notes: The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distances (4000 feet [1219m]). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances, End-Of-Line (EOL) termination is required.

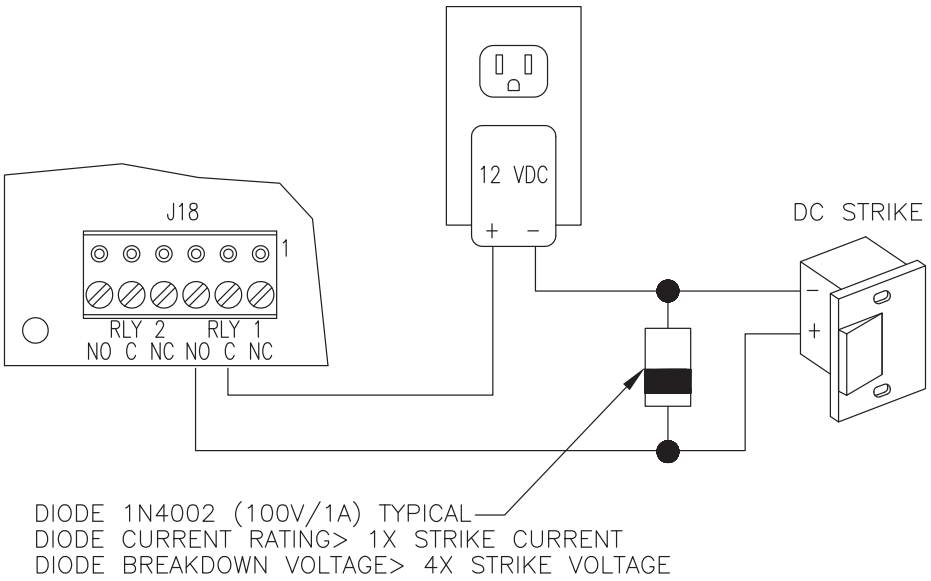
RS-485 must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has an on-board terminator. The installer should determine which device is at the end of the communication line.

42.4 Control Output Wiring

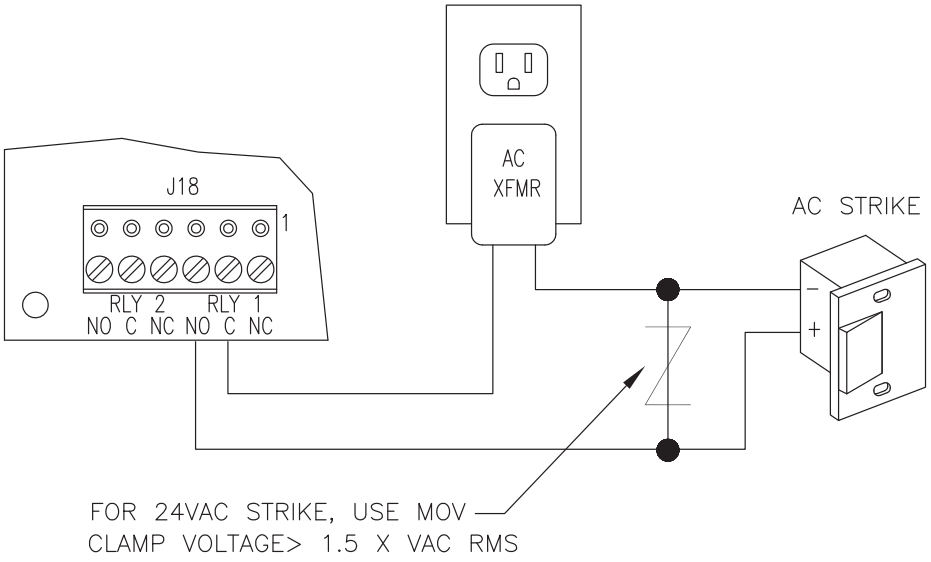
Contact protection circuit must be used. The following two circuits are recommended. Locate the protection circuit as close to the load as possible (within 12 inches [30cm]), as the effectiveness of the circuit will decrease if it is located further away.

42.4.1 Relay Outputs

Relay contact (DC strike)



Relay contact (AC strike)



42.5 Elevator Control

OnGuard hardware is capable of supporting elevator control for up to 128 floors. An elevator reader has an input/output module that controls the access to floors via an elevator.

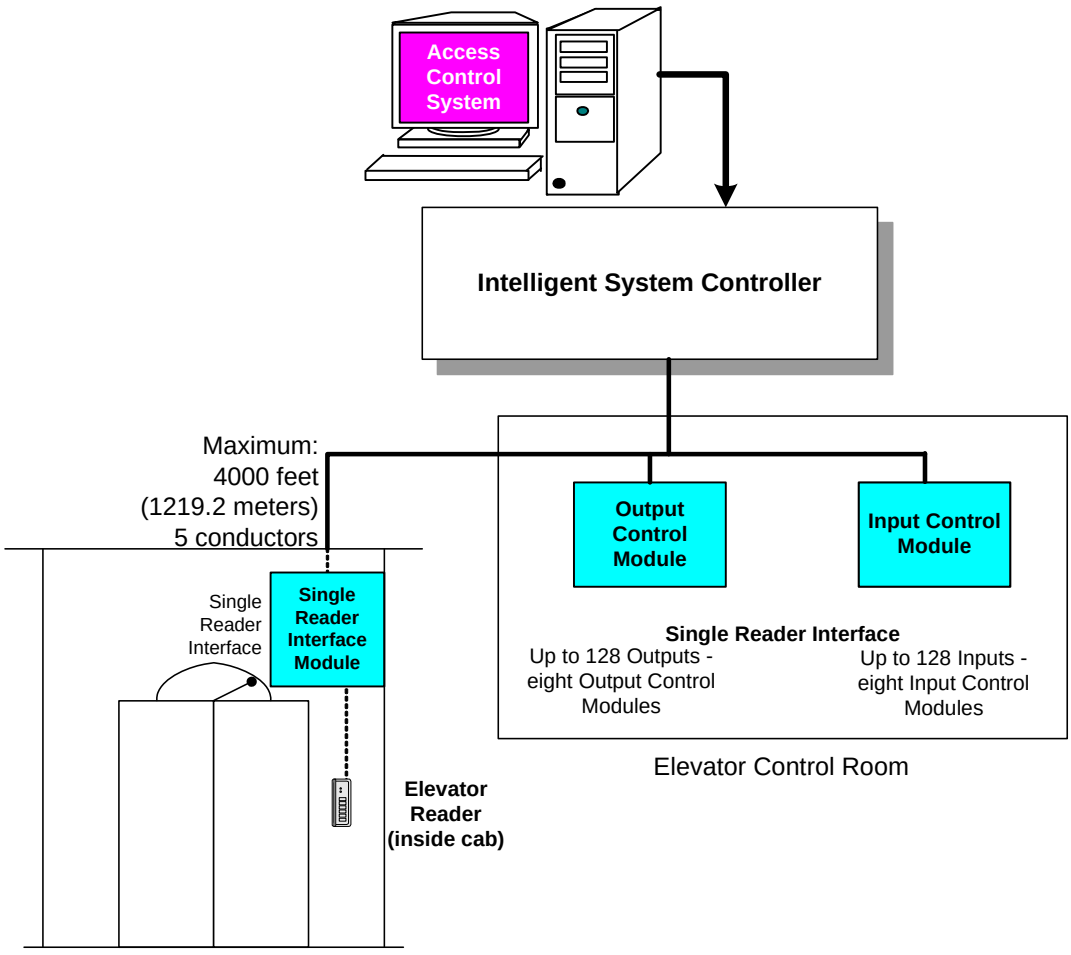
The OnGuard software must be configured for elevator control. This can be done from System Administration by selecting the **Elevator** check box on the General tab in the Readers and Doors form. The reader's type, name, port, address, and access panel can all be defined here as well.

Note: In order for this check box to be available, the access panel to which this reader module is connected must have **Elevator support** enabled on the Options tab.

With elevator control on the LNL-1300 reader, door strike and contact are not available, and REX (Request to EXit) is disabled.

Addresses assigned to input/output panels do not need to be consecutive. On the first panel, the inputs/outputs represent the first sixteen floors (e.g.: Input 1 = first floor, Input 2 = second floor, etc.). The second panel represents the next sixteen floors (floor 17 through 32), etc.

Overview of Elevator Control



42.6 Power and Communications

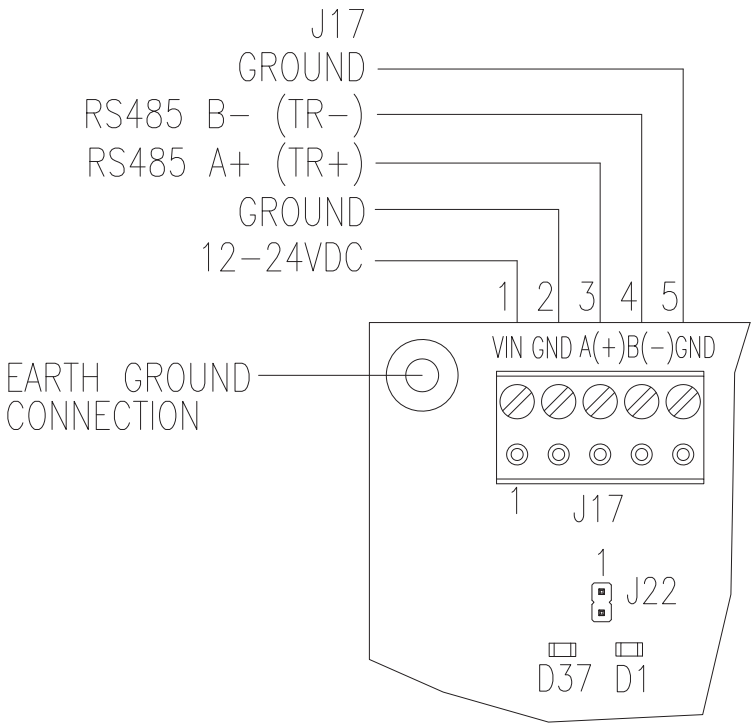
The Input Control Module requires a 12 to 24 VDC ± 10% power source for its input power.

Wire the Power In input with 18 AWG (minimum) twisted pair cable.

Power Source	Requirements	Current
DC power source	Isolated, non-switching, regulated DC power	300mA for 12VDC 150mA for 24VDC

Note: Be sure to observe polarity.

Power source wiring



42.7 UL Listed Installations

For UL Installations, the following must be observed:

- All field wiring terminals are suitable for single wire only.
- Use 22 AWG minimum for wiring all inputs and RS-485.
- The use of AC Strikes is “Not Evaluated by UL” and therefore cannot be used in UL Installations.
- Environmental for UL installations:
  - Temperature: -10 to +49°C (14 to 120°F) operating
  - Humidity: 85+/-5% at 30+/-2°C (86°F)

43 Specifications

Note: For UL installation, refer to section UL Listed Installations on page 250.

The LNL-1100-U is for connection to low voltage, class 2 power-limited circuits only. These specifications are subject to change without notice.

- Primary power: 12 to 24 VDC + 10%
  - 12 VDC @ 300 mA nominal
  - 24 VDC @ 150 mA nominal
  - 12.3 BTU/hour
- Output: Two (2) outputs, Form-C contacts: Relay 1 and 2 (K1 and K2), 5 A @ 30 VDC
- Inputs:
  - Sixteen (16) unsupervised/supervised, standard EOL: 1k/1k ohm, 1%, 1/4 watt
  - One (1) unsupervised, dedicated external (cabinet) tamper
  - One (1) unsupervised, AC power fail
- Communication: RS-485, 2-wire, 2400 to 38400 bps
- Cable requirements:
  - Power: 18 AWG, 1 stranded twisted pair
  - RS-485: 24 AWG, 120 ohm impedance, stranded twisted pair with shield, 4000 feet [1219 m] maximum
  - Alarm inputs: 1 stranded twisted pair, 30 ohms maximum
  - Outputs: as required for the load
- Mechanical:
  - Dimension: 5 x 8 x 1.25 in. (127 x 203 x 32 mm)
  - Weight: 6.2 oz. (188 g) nominal
- Environmental:
  - Temperature: -10 to +70°C (14 to 158° F) operating, -40 to +85°C (-40 to 185°F) storage
  - Humidity: 10% at 93°C (199°F) non-condensing operating, 10 to 95% at 85°C (185°F) non-condensing storage
- Certifications:
  - FCC Part 15
  - ETL 294, s319
  - UL294, 1076
  - C-Tick N22193
  - CE marking
  - RoHS
  - Environmental class: Indoor dry
  - WEEE

LNL-1200 OUTPUT CONTROL MODULE

44 Overview of the LNL-1200

The Output Control Module (OCM) communicates directly with the Intelligent System Controller (ISC) either by RS-485 communication. Each OCM is an individually addressed device, with a maximum of sixteen OCMs on each ISC.

The OCM, like most other Lenel hardware products, can be powered by 12 to 24 VDC power. Dedicated tamper and power failure input contacts are included with every OCM.

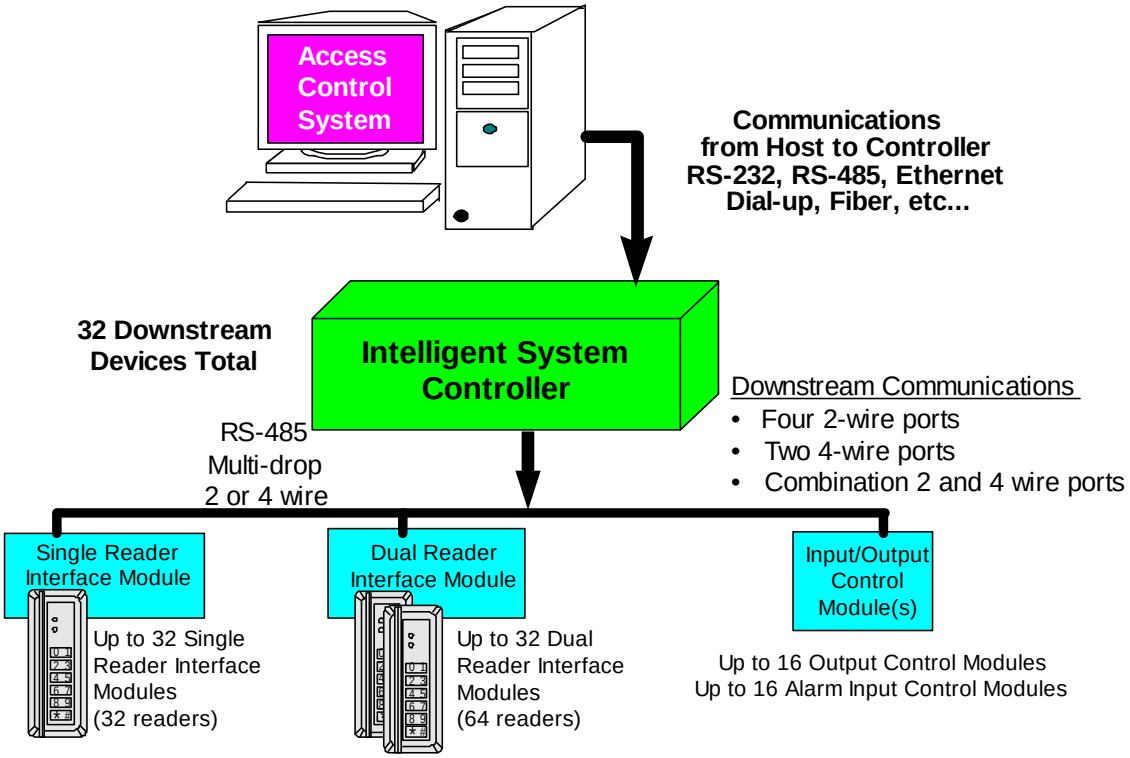
The OCM has 16 programmable output relays that can be configured for fail-safe or fail-secure. Each relay supports “On,” “Off,” and “Pulse” software commands.

The series 2 board differs slightly from the series 1 boards. Where series 2 is indicated, the information only applies to series 2 boards. Otherwise, the information applies to both series 1 and 2 boards.

44.1 Interfaces

The Output Control Module interfaces upstream with the Intelligent System Controller.

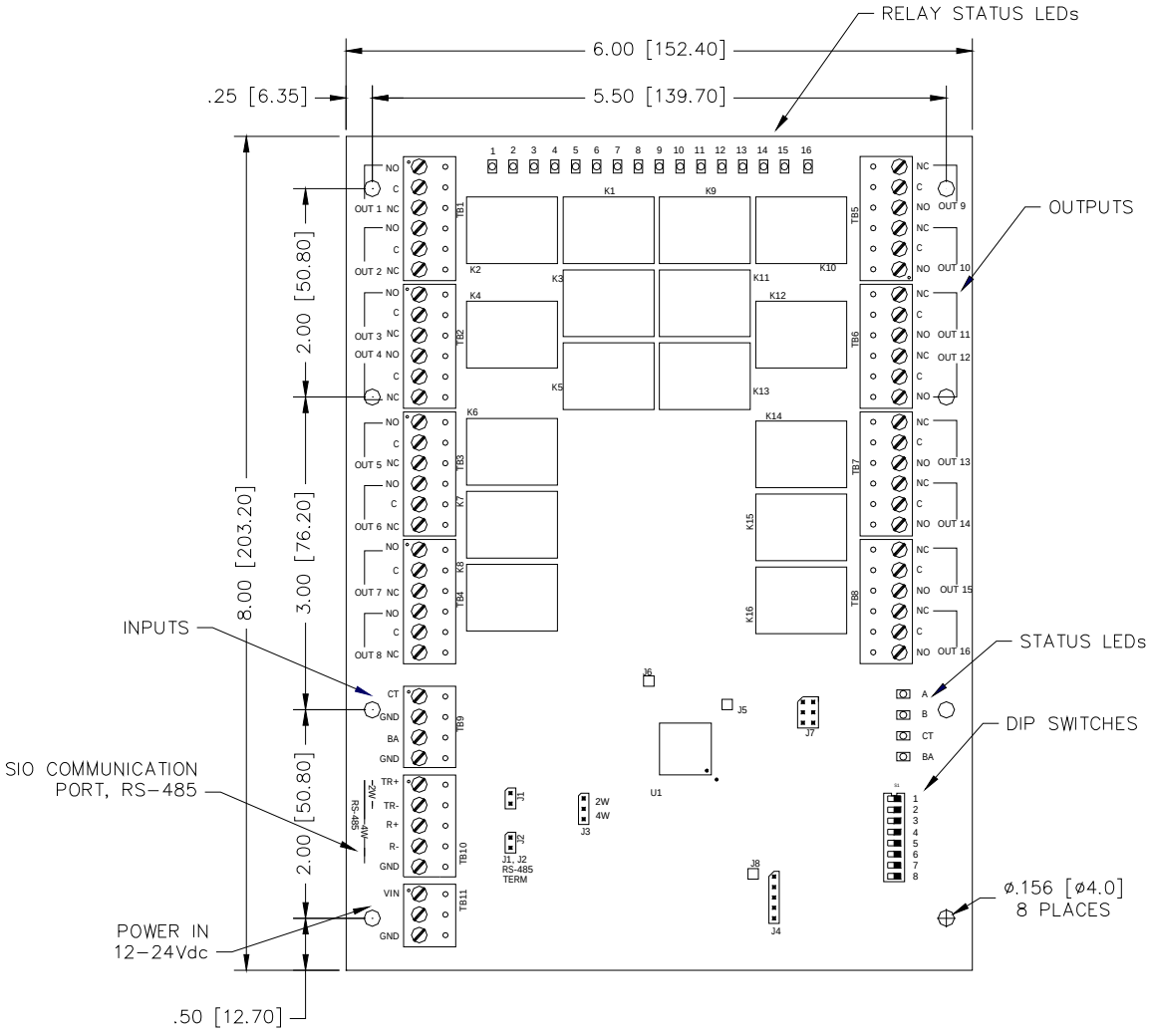
Intelligent System Controller Communications Overview


Access Control System
Communications from Host to Controller
RS-232, RS-485, Ethernet
Dial-up, Fiber, etc...
32 Downstream Devices Total
Intelligent System Controller
Downstream Communications
• Four 2-wire ports
• Two 4-wire ports
• Combination 2 and 4 wire ports
RS-485
Multi-drop
2 or 4 wire
Single Reader Interface Module
Up to 32 Single Reader Interface Modules (32 readers)
Dual Reader Interface Module
Up to 32 Dual Reader Interface Modules (64 readers)
Input/Output Control Module(s)
Up to 16 Output Control Modules
Up to 16 Alarm Input Control Modules

44.2 The Output Control Module (Series 2)

The LNL-1200 series 2 board contains the following components: sixteen (16) alarm output relays with sixteen (16) corresponding status LEDs, two (2) unsupervised alarm inputs, one (1) RS-485 interface, one (1) power input, eight (8) DIP switches, and jumpers.

Output Control Module



44.2.1 Status LEDs

The series 2 Output Control Module contains a total of 20 LEDs to verify correct installation after power up.

Power-up: All LED's OFF.

Initialization: Once power is applied, initialization of the module begins.

The A LED is turned on at the beginning of initialization. If the application program cannot be run, the A LED will flash at a rapid rate. The OCM is waiting for firmware to be down loaded.

When initialization is completed, LEDs A, B, CT and BA are briefly sequenced ON then OFF.

Run time: After the above sequence, the LEDs have the following meanings:

A LED: Heartbeat and Online Status:

- Offline: 1 second rate, 20% ON.
- Online: 1 second rate, 80% ON.

B LED: Communication Port Status:

- Indicates communication activity on the communication port.

CT: Cabinet Tamper.

BA: Power Fault.

Input in the inactive state: OFF (briefly flashes ON every 3 seconds).

Input in the active state: ON (briefly flashes OFF every 3 seconds).

LEDs 1 through 16: correspond to output relay OUT 1 (K1) through OUT 16 (K16).

44.2.2 Series 1 and Series 2

The following tables list the differences between series 1 and series 2 hardware.

Output Control Module

Feature	Series 1	Series 2
Serial number	less than 520,000	520,000 or greater (revision C)
Input power	12 VDC ±10% or 12 VAC ±15%	12 to 24 VDC ±10%
ISC communication	2-wire or 4-wire RS-485	2-wire RS-485 only
Status LEDs	2 for board status	2 for board status, 16 for relay status, 2 for tamper/power fault status

45 Installation

To install the Output Control Module, perform the installation procedures described in the following sections, in the order in which they are presented.

45.1 Wiring

1. Wire the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
2. Wire the upstream host communication.
3. Wire the relay outputs.
4. Wire the power input.

45.1.1 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

The Output Control Module features two unsupervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the BA (power fault) and CT (cabinet tamper) contact terminals located on the Output Control Module.

The BA and CT inputs are simple N/C (normally closed) contact closure monitors.

Wire the BA and CT inputs using twisted pair cable, 30 ohms maximum (No EOL resistors are required).

Unsupervised Alarm Input Wiring (BA and CT contacts)

Note: If either of these inputs is not used, a shorting wire should be installed.

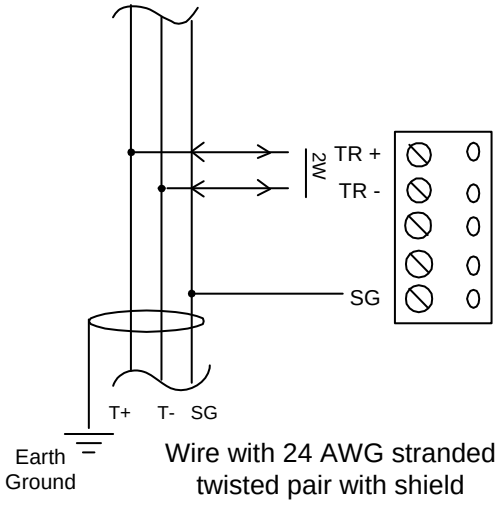
45.1.2 Upstream Communication to the Intelligent System Controller

The Output Control Module uses Port 1 to communicate to the Intelligent System Controller. Port 1 is an RS-485 interface that requires the following type of RS-485 cable: 24 AWG (minimum) twisted pair (with shields). Either 2-wire or 4-wire RS-485 cable configuration can be used for series 1. Only 2-wire RS-485 cable configuration can be used for series 2. The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842, West Penn, or equivalent). The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet (Belden 9502 or equivalent).

The RS-485 communication is asynchronous, half-duplex, using 1 start bit, 8 data bits, 1 stop bit.

LNL-1200 series 2 upstream controller communication wiring: 2-wire (port 1)

RS-485 2-WIRE COMMUNICATIONS



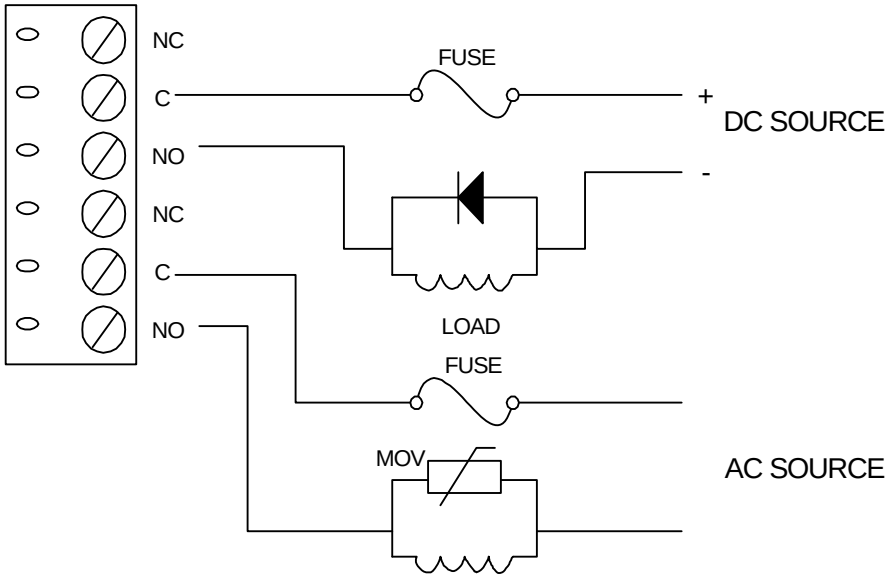
45.1.3 Relay Outputs

The Output Control Module contains sixteen (16) form-C dry-contact relay outputs, Output 1 through Output 16, which each provide up to 5A 30 VDC, or 125 VAC current (resistive). Each output is an SPDT (single pole, double throw) contact.

To wire the Output 1 - Output 16 relay contacts, use sufficiently large wires for the load to avoid voltage loss.

Transient clamping must be provided to protect the output contacts and to reduce EMI emissions. For AC-powered devices, use MOV across the load. For DC-powered devices, use a diode across the load.

Relay Output Wiring (Ports 2-5)



45.1.4 Power

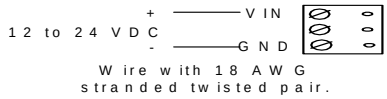
For its power input, the series 2 Output Control Module accepts either a 12 to 24 VDC ± 10% power source. The power source should be located as close to the Output Control Module as possible.

Wire the Power In input with 18 AWG (minimum) twisted pair cable.

Power Source	Requirements	Current
DC power source	Isolated, non-switching, regulated DC power	500 mA

Note: Be sure to observe polarity.

Power Source Wiring.



45.2 Elevator Control

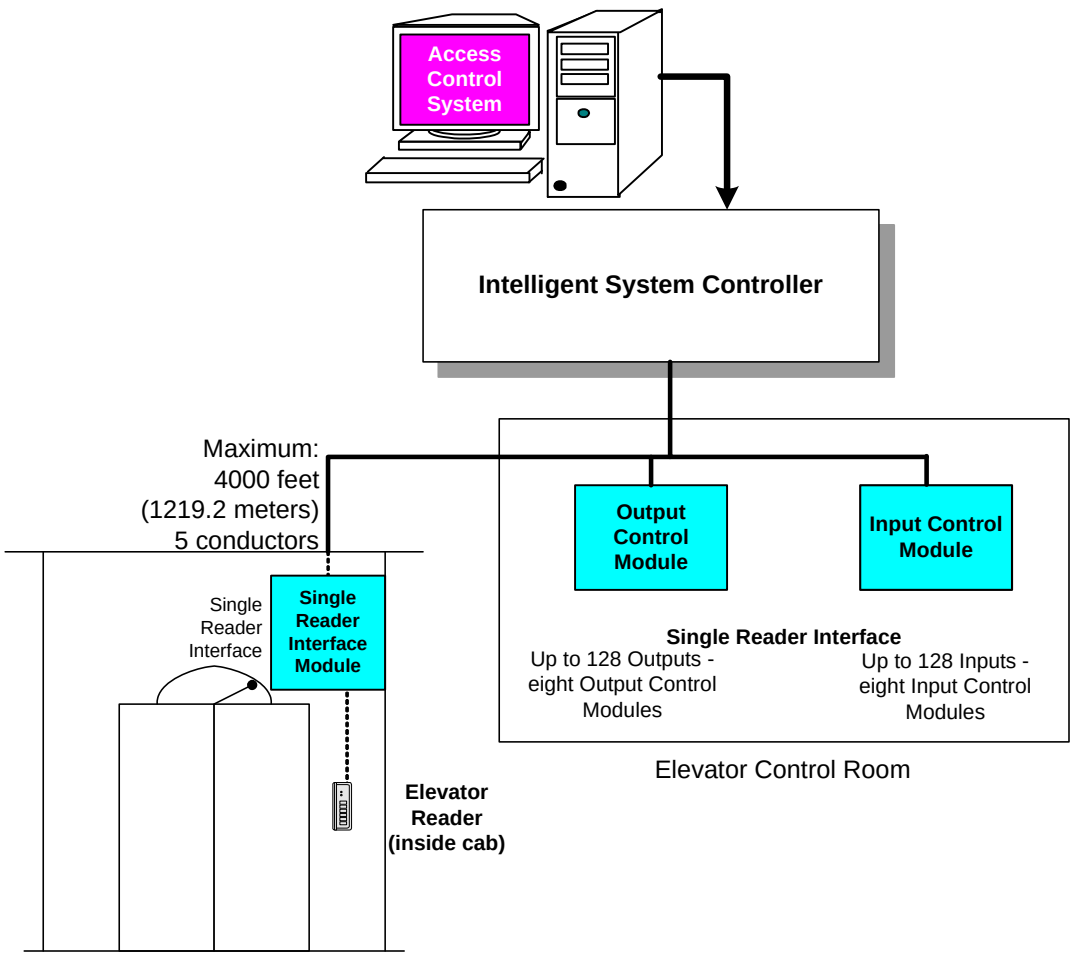
OnGuard hardware is capable of supporting elevator control for up to 128 floors. An elevator reader has an input/output module that controls the access to floors via an elevator.

The application software must be configured for elevator control. This can be done on the Elevator Hardware tab in the Readers window of the System Administration software. The “Elevator” box should be checked. The reader’s type, name, port, address, access panel, can all be defined here.

With elevator control on the LNL-1300 reader, door strike and contact are not available, and REX (Request to EXit) has been disabled.

Addresses assigned to input/output panels do not have to be consecutive. On the first panel, the inputs/outputs represent the first sixteen floors (e.g.: Input 1 = first floor, Input 2 = second floor, etc.). The second panel represents the next sixteen floors (floor 17 through 32), etc.

Overview of Elevator Control

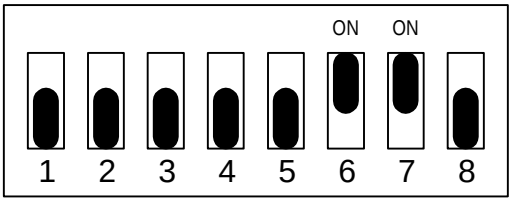


46 Configuration

The Output Control Module board contains **8 DIP switches** and **3 jumpers** that *must be configured* for your system.

46.1 Setting DIP Switches

DIP Switches (shown in factory default position: Address 00; 38400 bps)



The following chart describes the use of each DIP switch.

DIP SWITCH(ES)	USED TO CONFIGURE:
1, 2, 3, 4, 5	Device communication address (0 - 31)
6, 7	Communication baud rate
8	Downstream encryption (available with OnGuard 2009 or later)

46.1.1 Device Address

To configure the device communication address, set DIP switches 1, 2, 3, 4, and 5 according to the following table.

ADDRESS	DIP SWITCH				
	1:	2:	3:	4:	5:
0	off	off	off	off	off
1	ON	off	off	off	off
2	off	ON	off	off	off
3	ON	ON	off	off	off
4	off	off	ON	off	off
5	ON	off	ON	off	off
6	off	ON	ON	off	off
7	ON	ON	ON	off	off
8	off	off	off	ON	off

ADDRESS	DIP SWITCH				
	1:	2:	3:	4:	5:
9	ON	off	off	ON	off
10	off	ON	off	ON	off
11	ON	ON	off	ON	off
12	off	off	ON	ON	off
13	ON	off	ON	ON	off
14	off	ON	ON	ON	off
15	ON	ON	ON	ON	off
16	off	off	off	off	ON
17	ON	off	off	off	ON
18	off	ON	off	off	ON
19	ON	ON	off	off	ON
20	off	off	ON	off	ON
21	ON	off	ON	off	ON
22	off	ON	ON	off	ON
23	ON	ON	ON	off	ON
24	off	off	off	ON	ON
25	ON	off	off	ON	ON
26	off	ON	off	ON	ON
27	ON	ON	off	ON	ON
28	off	off	ON	ON	ON
29	ON	off	ON	ON	ON
30	off	ON	ON	ON	ON
31	ON	ON	ON	ON	ON

46.1.2 Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table.

BAUD RATE:	DIP SWITCH	
	6:	7:
38,400 bps (default)	ON	ON
19,200 bps	off	ON

BAUD RATE:	DIP SWITCH	
	6:	7:
9600 bps	ON	off
115,200 bps	off	off

Currently, OnGuard only supports a baud rate of 38400 bps, so be sure to set both DIP switches 6 and 7 to the ON position.

46.1.3 Communication Password Status

DIP switch 8 controls the utilization of encryption.

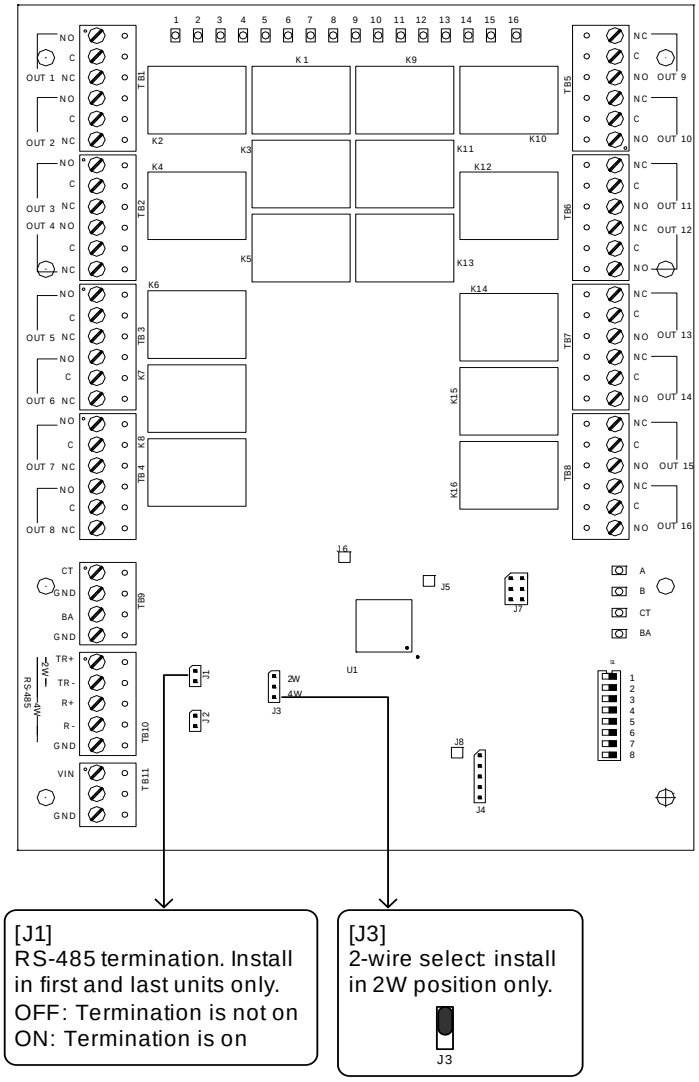
PASSWORD STATUS	DIP SWITCH 8: (OnGuard 2009 or later)	DIP SWITCH 8: (prior to OnGuard 2009)
Encryption is optional	off	Normal operation
Encryption is required	ON	Not allowed

When DIP switch 8 is ON, communication will not be allowed unless the access panel supports downstream encryption and is configured to enable encryption to this device.

When DIP switch 8 is off, the device will accept either encrypted or unencrypted communication. It must be off if the access panel does not support downstream encryption, or if downstream encryption is disabled for this device.

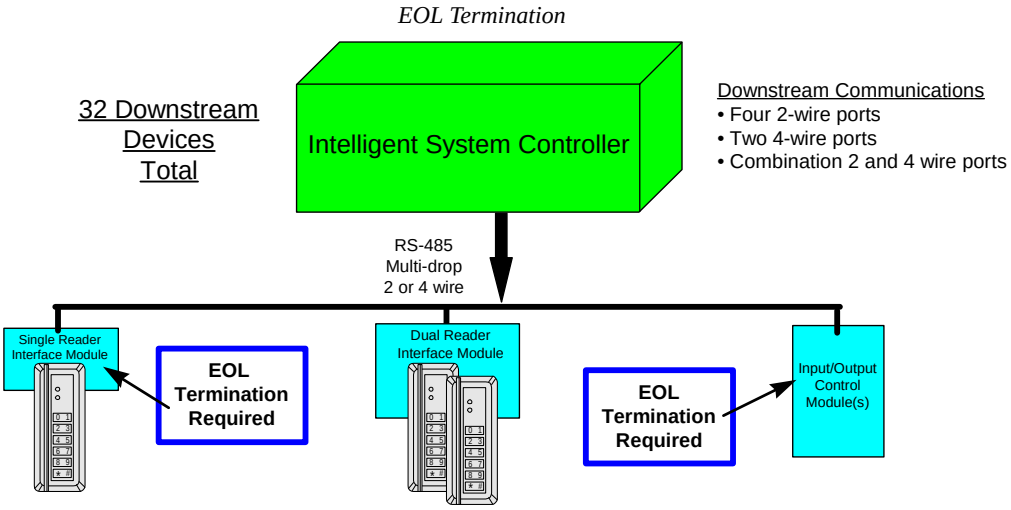
46.2 Installing Jumpers

The following diagram describes the use of each jumper on the board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.


[J1]
RS-485 termination. Install in first and last units only.
OFF: Termination is not on
ON: Termination is on
[J3]
2-wire select: install in 2W position only.
J3

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distances (4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances, End-Of-Line (EOL) termination is required.

RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has on-board terminators. The installer should determine which devices are at the end of the communication line.


EOL Termination
32 Downstream Devices Total
Intelligent System Controller
Downstream Communications
• Four 2-wire ports
• Two 4-wire ports
• Combination 2 and 4 wire ports
RS-485
Multi-drop
2 or 4 wire
Single Reader Interface Module
EOL Termination Required
Dual Reader Interface Module
EOL Termination Required
Input/Output Control Module(s)

47 Specifications

** The LNL-1200 series 2 is for use in low voltage, class 2 circuits only. These specifications are subject to change without notice.

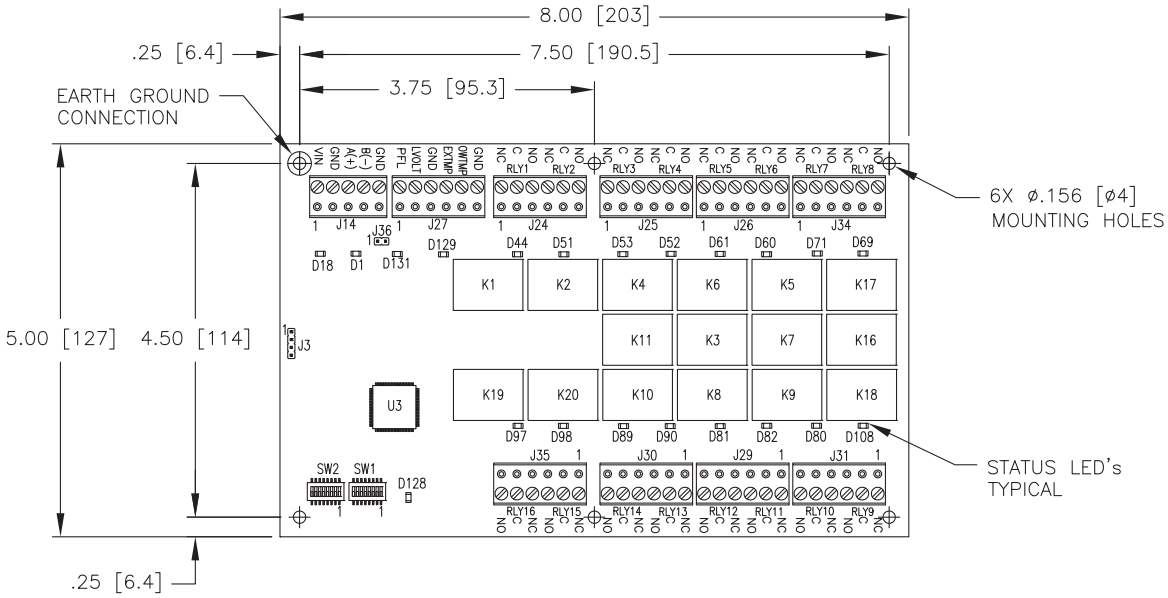
- Primary Power:
  - 12 to 24 VDC ± 10%, 1100mA maximum
  - 12 VDC @ 850mA nominal
  - 24 VDC @ 450mA nominal
- Relay contacts: 16 Form-C, 5A @ 28 VDC, resistive
- Inputs: 2 unsupervised, dedicated for cabinet tamper and UPS fault monitoring
- Communication: RS-485, 2-wire, 9600 to 115,200 bps async
- Cable Requirements:
  - Power: 1 stranded twisted pair, 18 AWG
  - RS-485: 24 AWG, 120 ohm impedance, stranded twisted pair(s) with shield, 4000 feet (1200 m) maximum
  - Inputs: stranded twisted pair, 30 ohms maximum
  - Outputs: as required for the load
- Mechanical:
  - Dimension: 6 x 8 x 1 in. (152 x 203 x 25 mm)
  - Weight: 14 oz. (435 g) nominal
- Environmental:
  - Temperature: -55 to +85° C storage, 0 to +70° C operating
  - Humidity: 0 to 95% RHNC
- Certifications:
  - UL294 & UL1076 Listed
  - ULC Listed
  - FCC Part 15
  - C-Tick
  - CE marking
  - RoHS compliant
  - WEEE

LNL-1200-U
OUTPUT CONTROL MODULE

48 Overview of the LNL-1200-U Board

The Output Control Module (OCM) board contains the following components: sixteen (16) alarm output relays with sixteen (16) corresponding status LEDs, two (2) unsupervised alarm inputs, one (1) RS-485 interface, power input, two (2) DIP switches, and jumpers.

OCM board (Dimensions are in inches [mm])



48.1 Package Contents

- LNL-1200-U board
- 1000 ohm resistors

49 Installation

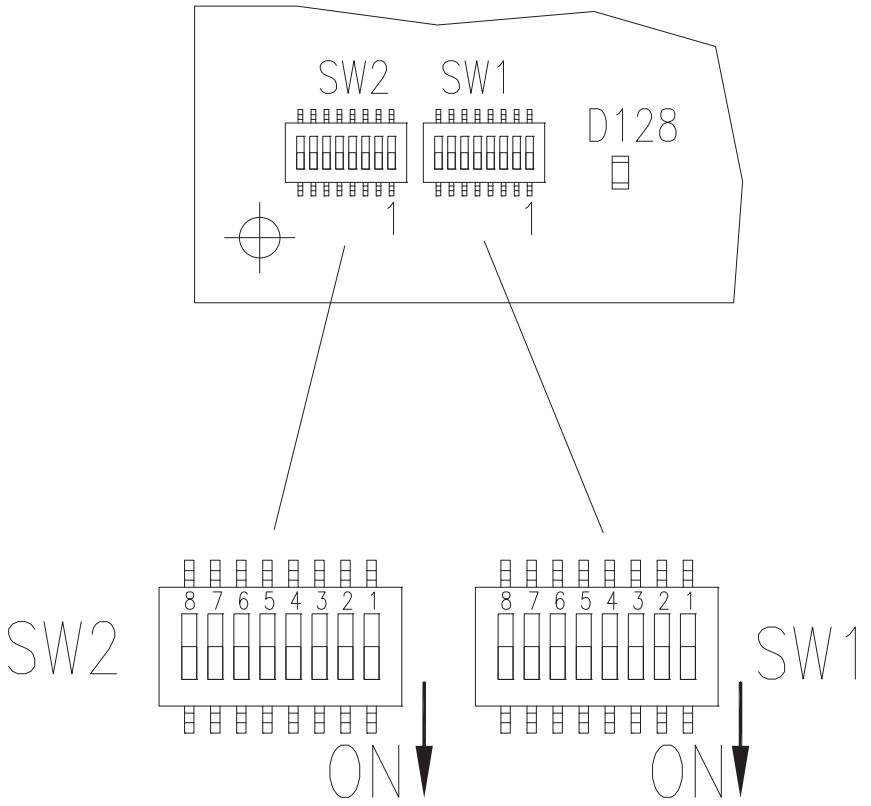
To install the Output Control Module, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Set baud rate (SW1), address (SW2), and LED control switches.
2. Install jumpers.
3. Mount the board into the enclosure.
4. Wire the unsupervised alarm inputs for power fail and external (cabinet) tamper.
5. Wire the upstream host communication.
6. Wire the relay outputs.
7. Wire the power and communications inputs.
8. Validate proper operation on power up.

50 Configuration

The Output Control Module board contains two (2) 8-position DIP switches that are user selectable to control addressing, baud rate, and other user functions, and one (1) RS-485 termination jumper used to configure the system.

50.1 Setting DIP Switches



50.1.1 Communication Baud Rate (SW1)

Configure the baud rate using SW1 switches 1-4. (Switch 5 is used for LED control. Switches 6-8 are not used.)

Baud rate	SW1 switch for host		SW1 switch for OSDP readers (Aux ports)	
	1:	2:	3:	4:
2400 bps	off	off	off	off
9600 bps	ON	off	ON	off
19200 bps	off	ON	off	ON
38400 bps	ON	ON	ON	ON

LED Mode

SW1 switch 5 is used for LED control. It is read at boot time. If you make a change to this setting, be sure to restart.

SW1 Switch 5	State
ON	LEDs behave as the Access (LNL) series module.
off	LED behavior is in Normal Mode

50.1.2 Device Address (SW2)

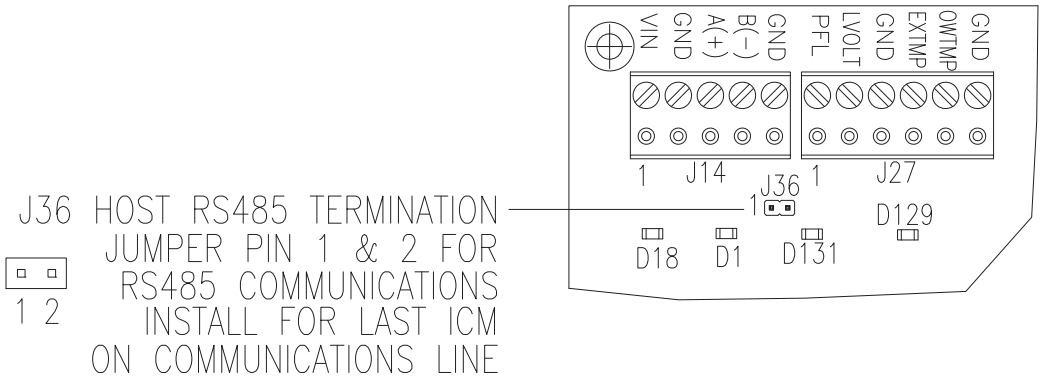
Configure the board address using SW2. (Switches 6-8 are not used.)

Address	SW2 switch				
	1:	2:	3:	4:	5:
0	off	off	off	off	off
1	ON	off	off	off	off
2	off	ON	off	off	off
3	ON	ON	off	off	off
4	off	off	ON	off	off
5	ON	off	ON	off	off
6	off	ON	ON	off	off
7	ON	ON	ON	off	off
8	off	off	off	ON	off
9	ON	off	off	ON	off
10	off	ON	off	ON	off
11	ON	ON	off	ON	off
12	off	off	ON	ON	off
13	ON	off	ON	ON	off
14	off	ON	ON	ON	off
15	ON	ON	ON	ON	off
16	off	off	off	off	ON
17	ON	off	off	off	ON
18	off	ON	off	off	ON
19	ON	ON	off	off	ON
20	off	off	ON	off	ON

Address	SW2 switch				
	1:	2:	3:	4:	5:
21	ON	off	ON	off	ON
22	off	ON	ON	off	ON
23	ON	ON	ON	off	ON
24	off	off	off	ON	ON
25	ON	off	off	ON	ON
26	off	ON	off	ON	ON
27	ON	ON	off	ON	ON
28	off	off	ON	ON	ON
29	ON	off	ON	ON	ON
30	off	ON	ON	ON	ON
31	ON	ON	ON	ON	ON

50.2 Installing Jumpers

Jumper configuration



To enable RS-485 termination, install jumper on pin header J36. For more information, refer to the Upstream Communication section on page 282.

Host Communications: Jumper J36 pins 1 & 2 for RS-485 communications. Install the jumper on the last OCM on the communications line.

50.3 Status LEDs

50.3.1 LED Table for Series 2 LNL-1200 Mode

When switch 5 is in the ON position, the LEDs behave like the series 2 LNL-1200.

Indication	LED	State
Power-up	ALL	Off
Initialization	D128	Flashing
After initialization	D128	Offline: 1 second rate, 20% ON Online: 1 second rate, 80% ON
Communications	D1	ON

50.3.2 LED Table for Normal Mode

When SW1 switch 5 is in the off position, the LEDs operate in Normal Mode. External tamper (cabinet tamper) must be open for Input LEDs to be on. When tamper is closed (cabinet door closed) Input LEDs will be off.

Indication	LED	State
RS-485 panel communication	D1	ON - Yellow
Power on	D18	ON - Green
Relay 1	D44	ON - Green
Relay 2	D51	ON - Green
Relay 3	D53	ON - Green
Relay 4	D52	ON - Green
Relay 5	D61	ON - Green
Relay 6	D60	ON - Green
Relay 7	D71	ON - Green
Relay 8	D69	ON - Green
Relay 9	D108	ON - Green
Relay 10	D80	ON - Green
Relay 11	D82	ON - Green
Relay 12	D81	ON - Green
Relay 13	D90	ON - Green
Relay 14	D89	ON - Green
Relay 15	D98	ON - Green

Indication	LED	State
Relay 16	D97	ON - Green
CPU status	D128	Offline: 1 second rate, 20% ON Online: 1 second rate, 80% ON
External (cabinet) tamper	D129	Open ON - Red
Power fail	D131	ON - Red

CPU status LED D128 possible module error conditions for LED Normal and Series 2 modes:

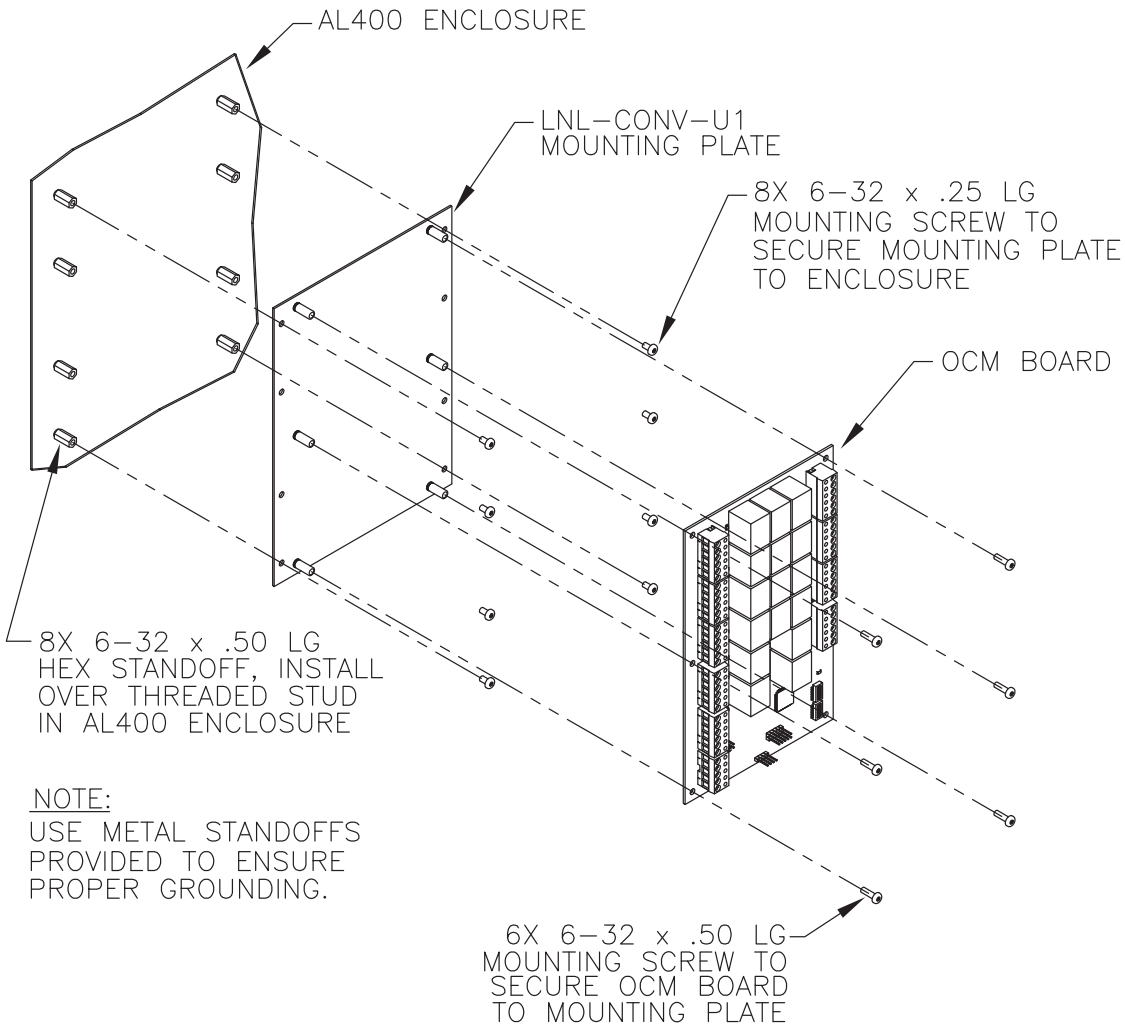
Error condition	Flashing pattern	Description
No valid application firmware	3 Red, 2 Green	The module is not operational. Firmware must be loaded using a console, e.g. HyperTerminal with Xmodem.
Boot loader waiting on firmware file	3 Red, 1 Green	Console boot loader is waiting on start of firmware file.
Boot loader loading firmware file	2 Red, 2 Green	Console boot loader is loading a firmware file.
Invalid EFL file	1 Red, 2 Green	The EFL specified to be loaded using the console loader is not a valid EFL file.
Invalid Xmodem packet	1 Red, 1 Green	The console loader received an invalid Xmodem packet and terminated the firmware download operation.
Invalid Application firmware for module CPU	3 Red, 0 Green	The module is not operational. Application firmware loaded on the module will not run properly. Requires new firmware be loaded using the console boot loader or the module must be returned for repair.
Invalid Boot firmware for module CPU	2 Red, 3 Green	The module is not operational. Boot loader firmware loaded on the module will not run properly. The module must be returned for repair.
Firmware update failed	1 Red, 3 Green	Firmware update operation was unsuccessful. Retry and if it fails continuously, load a different firmware file.
No valid primary firmware copy	3 Green, 2 Red	The firmware flash contains 2 copies of the application firmware. The primary copy is not valid so the backup copy will be loaded into the primary copy and executed.
No valid backup firmware copy	3 Green, 1 Red	The firmware flash contains 2 copies of the application firmware. The backup copy is not valid so the primary copy will be loaded into the backup copy.

Error condition	Flashing pattern	Description
No valid manufacturing parameters	3 Green, 0 Red	The manufacturing parameters which include the serial number, etc. are invalid. The module must be returned for repair.

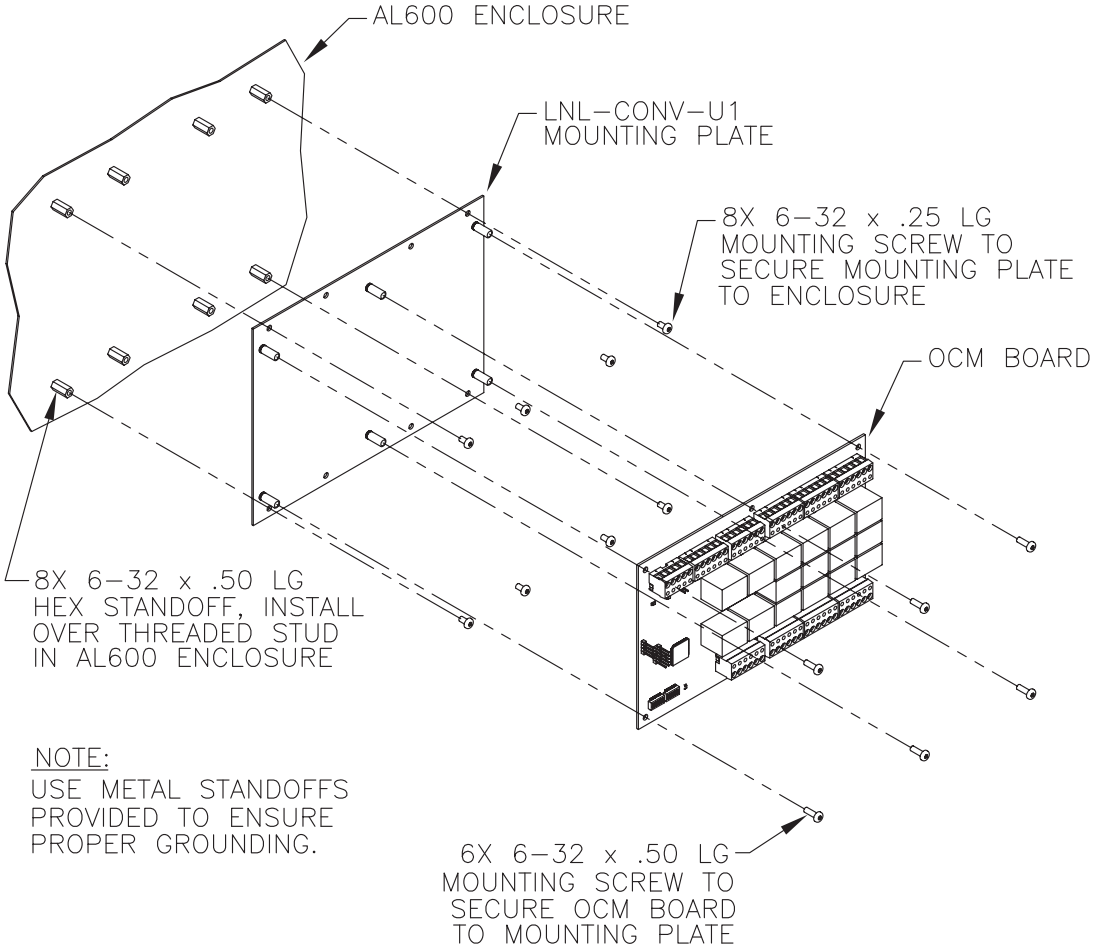
51 Mounting

The OCM can be mounted in the LNL-AL400ULX or LNL-AL600ULX-4CB6 and the LNL-CTX or LNL-CTX6 enclosure using the Universal Mounting Plate (UMP) LNL-CONV-U1.

Mounting the OCM in the LNL-AL400ULX and LNL-CTX



Mounting the OCM in the LNL-AL600ULX-4CB6 or LNL-CTX6



52 Wiring

For UL installations, refer to section UL Listed Installations on page 286.

52.1 Unsupervised Alarm Inputs: Power Fail and External (Cabinet) Tamper

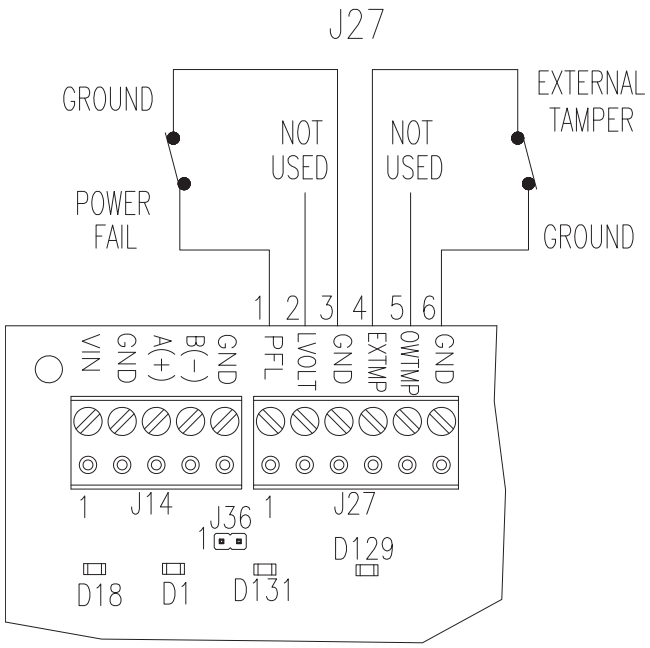
The Output Control Module features two (2) unsupervised alarm inputs that can be used for power fail and external (cabinet) tamper monitoring. These inputs are connected using the PFL (power fail) and EXTMP (cabinet tamper) contact terminals located on the Output Control Module.

The PFL and EXTMP inputs are simple N/C (normally closed) contact closure monitors.

Wire the PFL and EXTMP inputs using twisted pair cable, 30 ohms maximum (No EOL resistors are required).

Connect the power fail monitoring device to J27 pins 1 & 3 and the External Tamper (cabinet tamper) pins 4 & 6. If not used, a jumper must be installed across pins 1 & 3 and 4 & 6.

Unsupervised Alarm Input Wiring (PFL and EXTMP contacts)



Note: Input Status LEDs will be off when the tamper device is in the closed position or the jumper is installed.

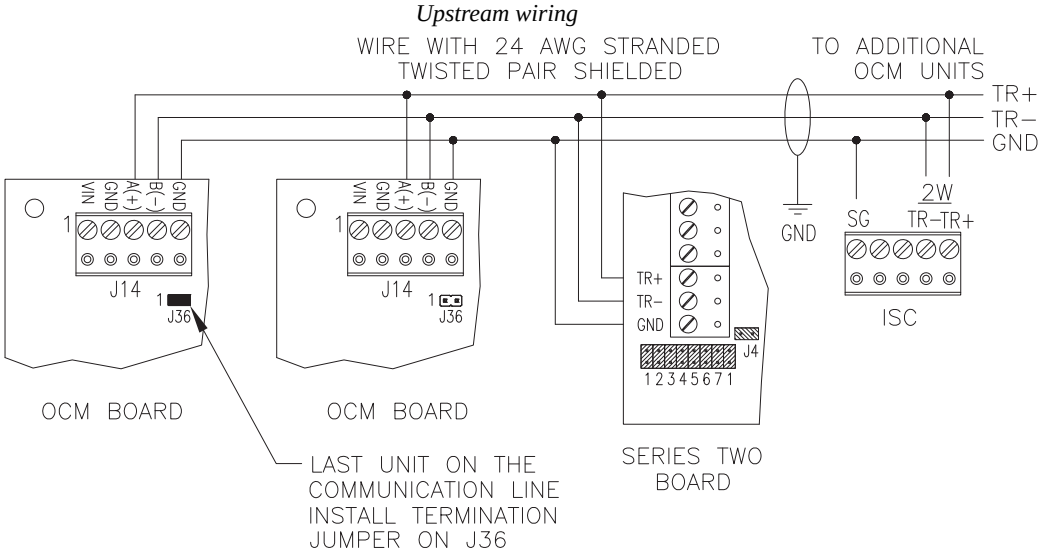
52.2 Upstream Communication

The OCM uses Port 1 to communicate to the Intelligent System Controller.

Port 1 is a 2-wire RS-485 interface, that requires the following type of RS-485 cable: 24 AWG (minimum) twisted pair (with shields). The main run RS-485 cable should be no longer than 4000 feet [1219 m], 100 ohms maximum (Belden 9841, West Penn, or equivalent). The drop cables (to downstream devices) should be kept as short as possible, no longer than 10 feet [3.048 m].

The RS-485 communication is asynchronous, half-duplex, using 1 start bit, 8 data bits, 1 stop bit.

Upstream wiring



To enable RS-485 termination, install jumper on pin header J36.

Notes:

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distances (4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances, End-Of-Line (EOL) termination is required.

RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has an on-board terminator. The installer should determine which device is at the end of the communication line.

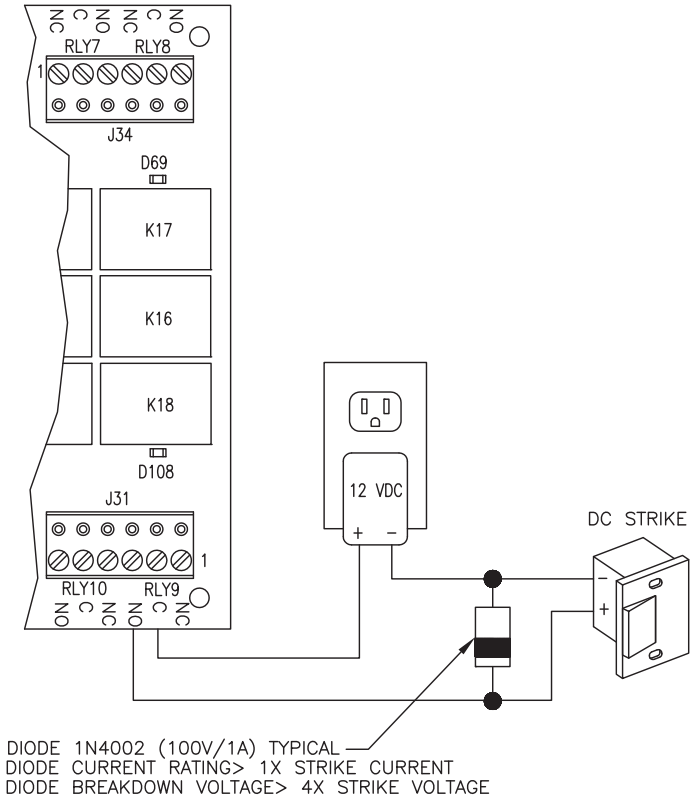
52.3 Relay Outputs

The Output Control Module contains sixteen (16) form-C dry-contact relay outputs, Relay 1 through 16 (K1-K11 & K16-K20). Each provides up to 5A 30VDC.

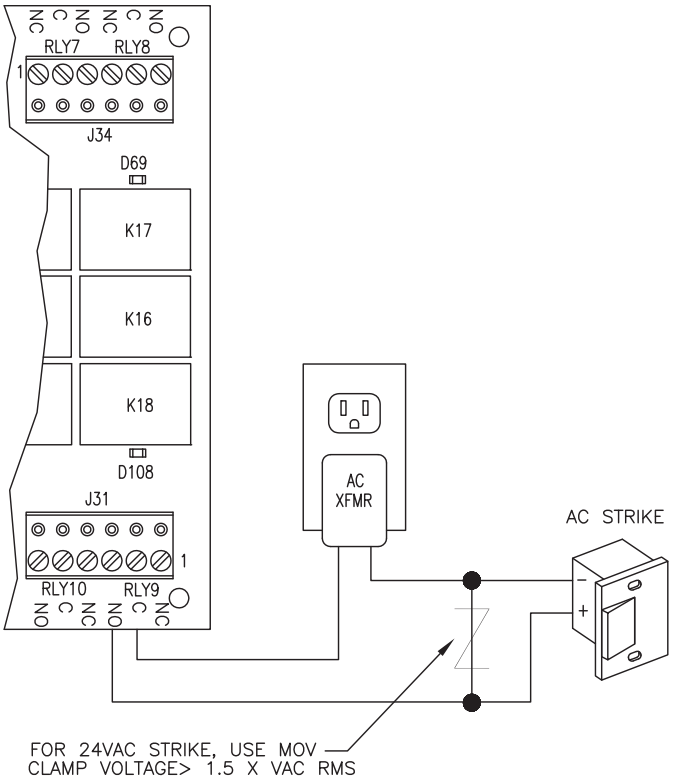
Transient clamping must be provided to protect the output contacts and to reduce EMI emissions.

For AC-powered devices, use MOV across the load. For DC-powered devices, use a diode across the load.

Relay contact (DC strike)



Relay contact (AC strike)



52.4 Elevator Control

OnGuard hardware is capable of supporting elevator control for up to 128 floors. An elevator reader has an input/output module that controls the access to floors via an elevator.

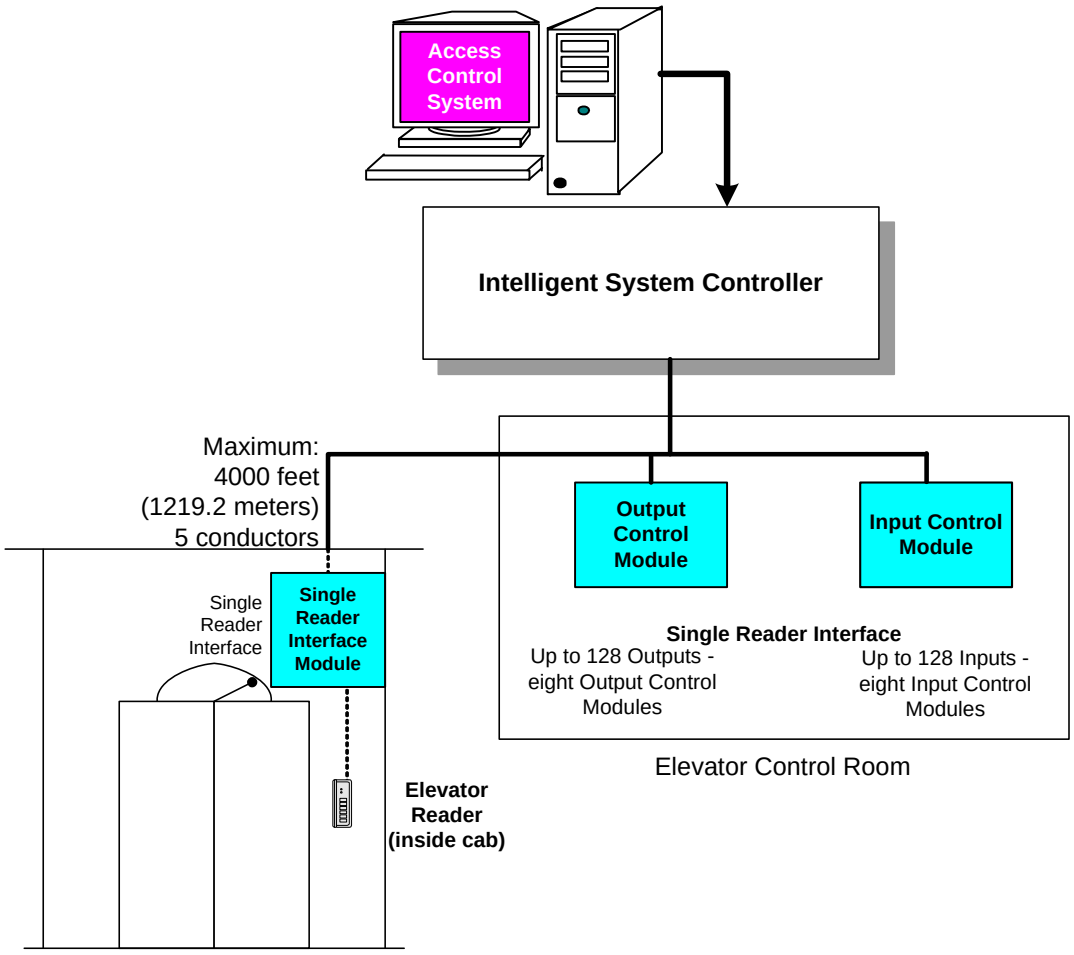
The OnGuard software must be configured for elevator control. This can be done from System Administration by selecting the **Elevator** check box on the General tab in the Readers and Doors form. The reader's type, name, port, address, and access panel can all be defined here as well.

Note: In order for this check box to be available, the access panel to which this reader module is connected must have **Elevator support** enabled on the Options tab.

With elevator control on the LNL-1300 reader, door strike and contact are not available, and REX (Request to EXit) is disabled.

Addresses assigned to input/output panels do not need to be consecutive. On the first panel, the inputs/outputs represent the first sixteen floors (e.g.: Input 1 = first floor, Input 2 = second floor, etc.). The second panel represents the next sixteen floors (floor 17 through 32), etc.

Overview of Elevator Control



52.5 Power and Communications

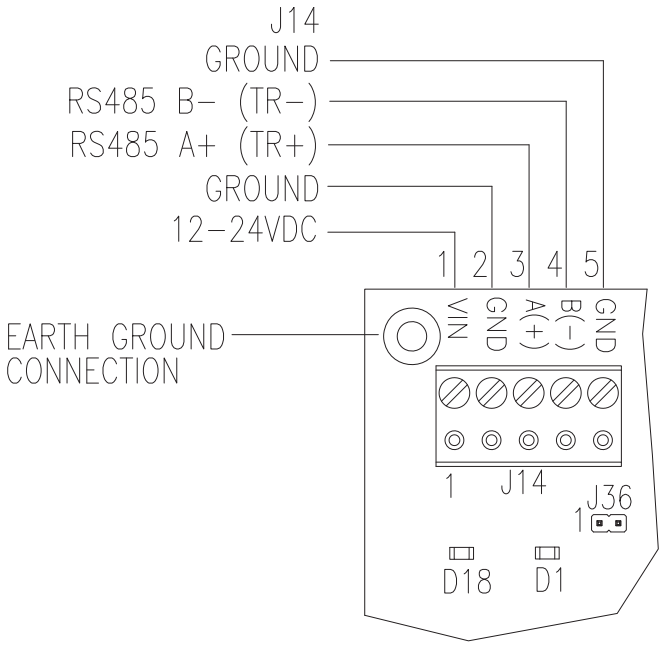
The Output Control Module requires a 12 to 24 VDC ± 10% power source for its input power.

Wire the Power In input with 18 AWG (minimum) twisted pair cable.

Power Source	Requirements	Current
DC power source	Isolated, non-switching, regulated DC power	805mA for 12VDC 407mA for 24VDC

Note: Be sure to observe polarity.

Power source wiring



52.6 UL Listed Installations

For UL installations, the following must be observed:

- All field wiring terminals are suitable for single wire only.
- Use 22 AWG minimum for wiring RS-485.
- RS-485 4-wire is “Not Evaluated by UL” and therefore cannot be used in UL Installations.
- The use of AC Strike is “Not Evaluated by UL” and therefore cannot be used in UL installations.
- Environmental for UL installations:
  - Temperature: -10 to +49°C (14 to 120°F) operating
  - Humidity: 85+/-5% at 30+/-2°C (86°F)

53 Specifications

Note: For UL installations, refer to section UL Listed Installations on page 286.

The LNL-1200-U is for connection to low voltage, class 2 power-limited circuits only. These specifications are subject to change without notice.

- Primary power: 12 to 24 VDC + 10%
  - 12 VDC @ 805 mA nominal
  - 24 VDC @ 407 mA nominal
  - 33 BTU/hour
- Relay contacts: 16 Form-C contacts: Relay 1-16 (K1-K11, K16-K20), 5 A @ 30 VDC
- Inputs:
  - One (1) unsupervised, dedicated external (cabinet) tamper
  - One (1) unsupervised, AC power fail
- Communication: RS-485 2-wire, 2400 to 38400 bps
- Cable requirements:
  - Power: 1 stranded twisted pair, 18 AWG
  - RS-485: 24 AWG, 120 ohm impedance, stranded twisted pair(s) with shield, 4000 feet (1219 m) maximum
  - Inputs:1 stranded twisted pair, 30 ohms maximum
  - Outputs: as required for the load
- Mechanical:
  - Dimension: 5 x 8 x 1.25 in. (127 x 203 x 32 mm)
  - Weight: 12.2 oz. (346 g) nominal
- Environmental:
  - Temperature: -10 to +70°C (14 to 158° F) operating, -40 to +85°C (-40 to 185°F) storage
  - Humidity: 10% at 93°C (199°F) non-condensing operating, 10 to 95% at 85°C (185°F) non-condensing storage
- Certifications:
  - FCC Part 15
  - ETL 294, s319
  - UL294, 1076
  - C-Tick N22193
  - CE marking
  - RoHS
  - Environmental class: Indoor dry
  - WEEE

LNL-1300 SINGLE READER INTERFACE MODULE

54 Overview of the LNL-1300

Lenel offers a Single Reader Interface (SRI) module for business access control solutions. Access control card readers, keypads, or readers with keypads that use standard data1/data0 and clock/data Wiegand communications are supported. Lock/unlock and facility code, off-line access modes are supported on all readers connected to the SRI. Each SRI supports up to 8 different card formats as well as issue codes for both magnetic and Wiegand card formats.

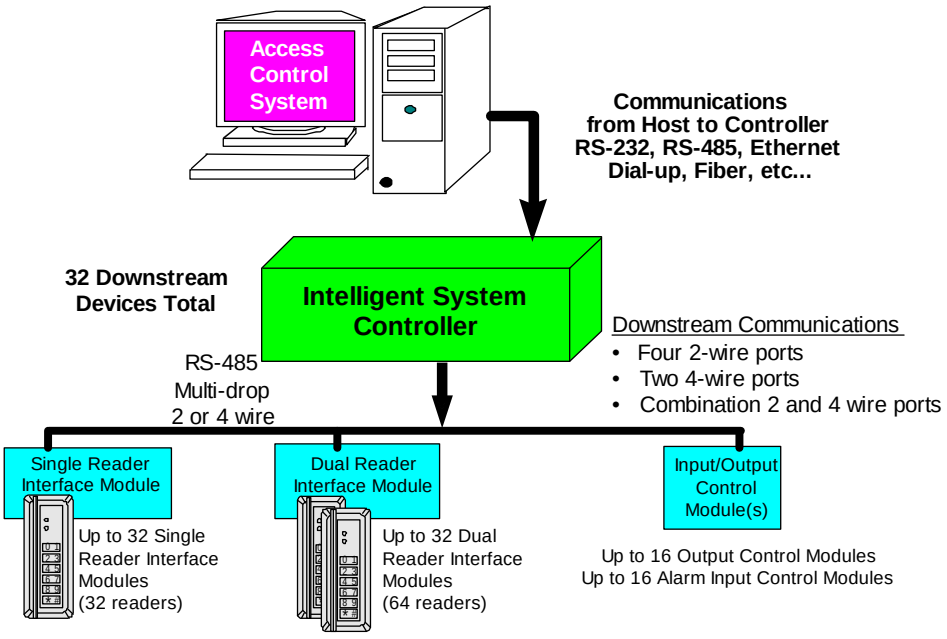
The SRI provides a vital link between the Intelligent System Controller (ISC) and the card reader attached to the interface. As many as 32 SRI modules can be multi-dropped using RS-485 two-wire communication up to 16,000 feet (4000 per port) away from the ISC. Each SRI module is individually addressed for increased reporting capabilities with Access Control software applications. The SRI includes two (2) programmable inputs that support normally open, normally closed, supervised and non-supervised circuits and two (2) output relays support fail-safe or fail-secure operation.

The series 2 board differs slightly from the series 1 boards. Where series 2 is indicated, the information only applies to series 2 boards. Otherwise, the information applies to both series 1 and 2 boards.

54.1 Interfaces

The Single Reader Interface Module interfaces upstream with the Intelligent System Controller, and downstream with a card reader.

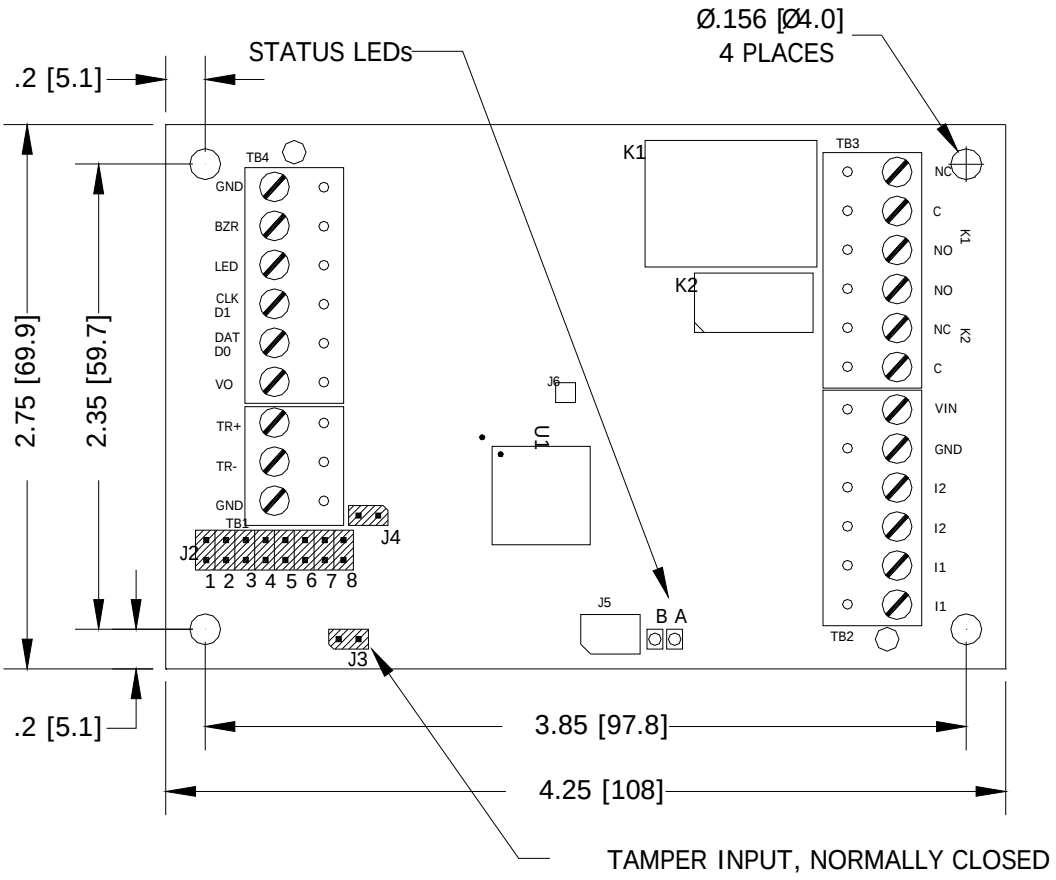
Intelligent System Controller Communications Overview


Access Control System
Communications from Host to Controller
RS-232, RS-485, Ethernet
Dial-up, Fiber, etc...
32 Downstream Devices Total
Intelligent System Controller
Downstream Communications
• Four 2-wire ports
• Two 4-wire ports
• Combination 2 and 4 wire ports
RS-485 Multi-drop 2 or 4 wire
Single Reader Interface Module
Up to 32 Single Reader Interface Modules (32 readers)
Dual Reader Interface Module
Up to 32 Dual Reader Interface Modules (64 readers)
Input/Output Control Module(s)
Up to 16 Output Control Modules
Up to 16 Alarm Input Control Modules

54.2 The Single Reader Interface Module Board (Series 2)

The series 2 Single Reader Interface Module board contains the following components: two (2) supervised alarm inputs, one (1) RS-485 two-wire interface, two (2) relay outputs, one (1) power input, and nine (9) jumpers. It also contains two (2) status LEDs. In older models of this board, there is one (1) TTL modular jack for reader interface.

Single Reader Interface Module



54.2.1 Status LEDs

The series 2 Single Reader Interface Module board contains two (2) status LEDs.

Power-up: All LEDs off.

Initialization: Once power is applied, initialization of the module begins.

The A LED is turned ON at the beginning of initialization. If the application program cannot be run, the A LED will flash at a rapid rate. The MR-50 is waiting for firmware to be down loaded.

Run time: After a successful initialization, the LEDs have the following meanings:

A LED: Heartbeat and On-Line Status:

- Offline: 1 second rate, 20% ON
- Online: 1 second rate, 80% ON

B LED: Communication Port Status:

- Indicates communication activity on the communication port.

54.2.2 Series 1 and Series 2

The following tables list the differences between series 1 and series 2 hardware.

Single Reader Interface Module

Feature	Series 1	Series 2
Serial number	less than 650,000	650,000 or greater (revision D)
Input power	12 VDC ±10%	12 to 24 VDC ±10%
Firmware updates	Replace chip	Download firmware into flash memory in the field supported
RS-485 reader interface	Not supported	Supported
Command keypad	Not supported	Supported, currently defaults to RS-485, address 0, 9600 baud

55 Installation

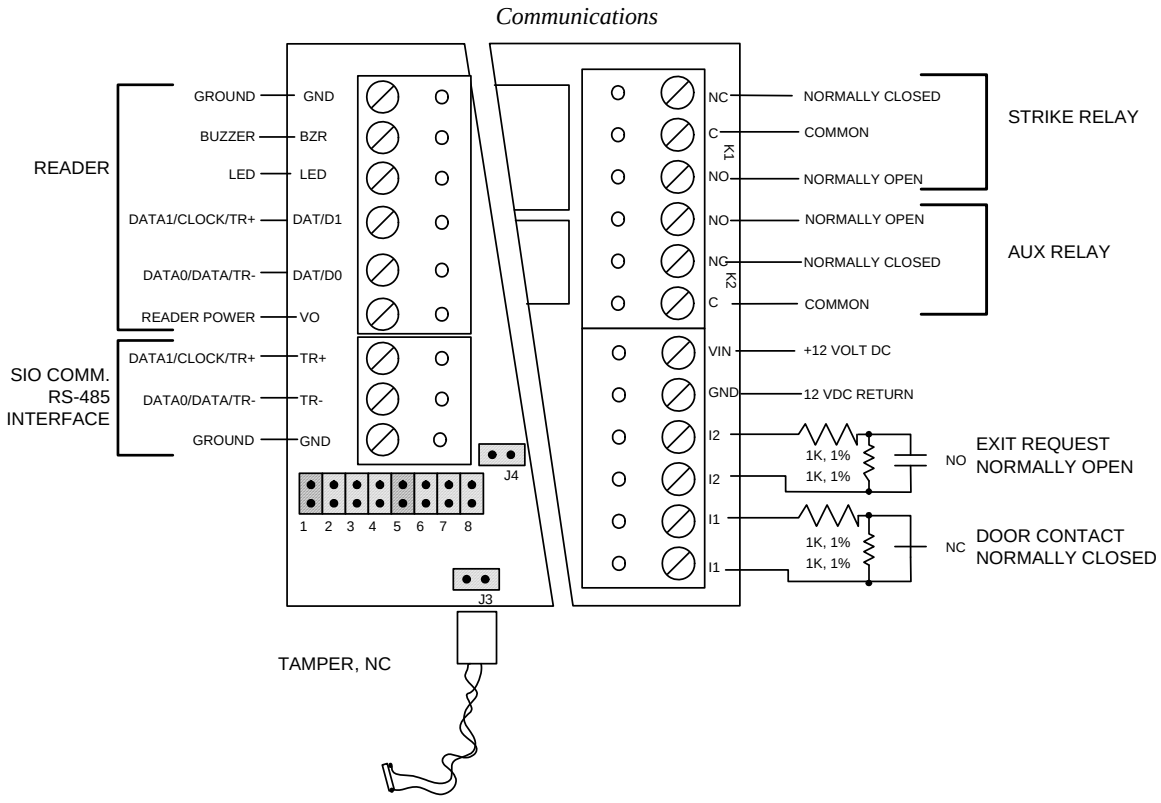
To install the SRI, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the supervised alarm inputs for door position and REX exit push button monitoring.
2. Wire the upstream host communication.
3. Wire the relay outputs.
4. Wire the downstream interface for the keypad or card reader (for older models of the SRI, a TTL interface is used).
5. Wire the power input.

55.1 Wiring

55.1.1 Supervised Alarm Inputs

The Single Reader Interface Module contains two (2) supervised alarm inputs that can be used for door position and REX exit push button monitoring. These alarm inputs are connected using the I1 and I2 inputs. Wire the I1 and I2 inputs using twisted pair cable, 30 ohms maximum. Terminate each of these inputs with two (2) 1000-ohm resistors (1% tolerance – 0.25 watt).



Door contact and REx are selectable through the access control software (by default, door contact is normally closed and REX is normally open).

55.1.2 Upstream Communication

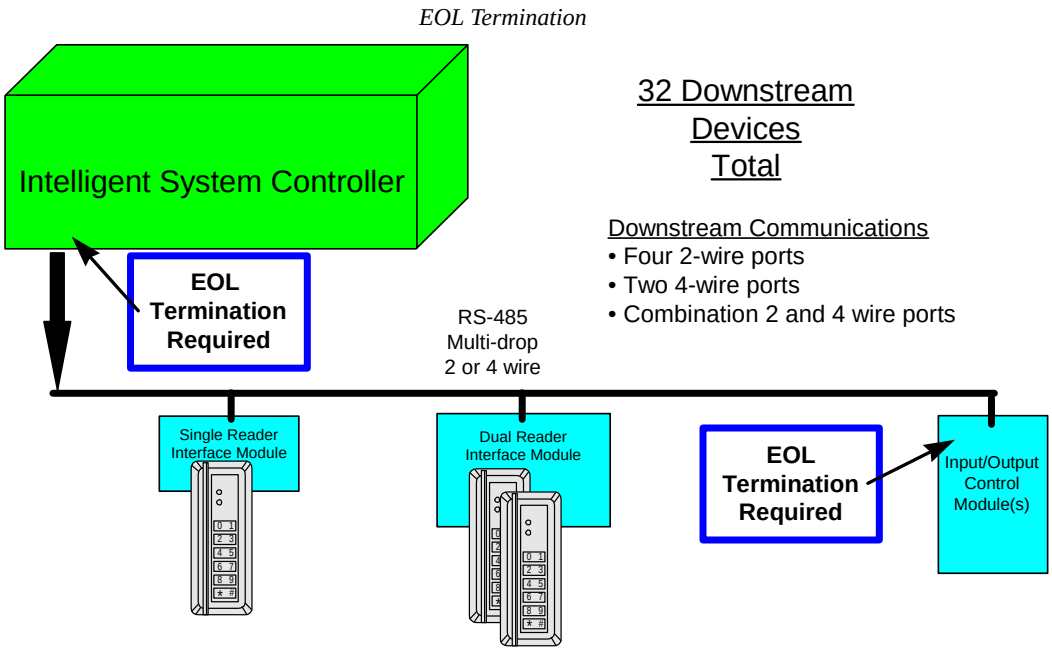
The Single Reader Interface Module uses Port 1 to communicate to the Intelligent System Controller.

Port 1 is a 2-wire RS-485 interface, that requires the following type of RS-485 cable: 24 AWG (minimum) twisted pair (with shields). The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9841, West Penn, or equivalent). The drop cables (to downstream devices) should be kept as short as possible, no longer than 10 feet.

The RS-485 communication is asynchronous, half-duplex, using 1 start bit, 8 data bits, 1 stop bit.

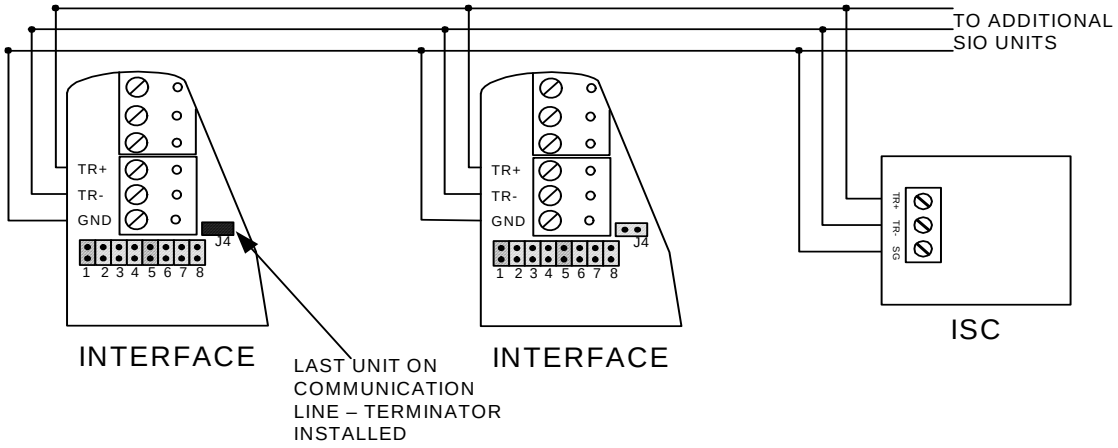
The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distances (4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances, End-Of-Line (EOL) termination is required.

RS-485 must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has an on-board terminator. The installer should determine which device is at the end of the communication line.



Note: If the Single Reader Interface Module is at the end of the RS-485 line, the J4 termination jumper must be set.

Controller Communication



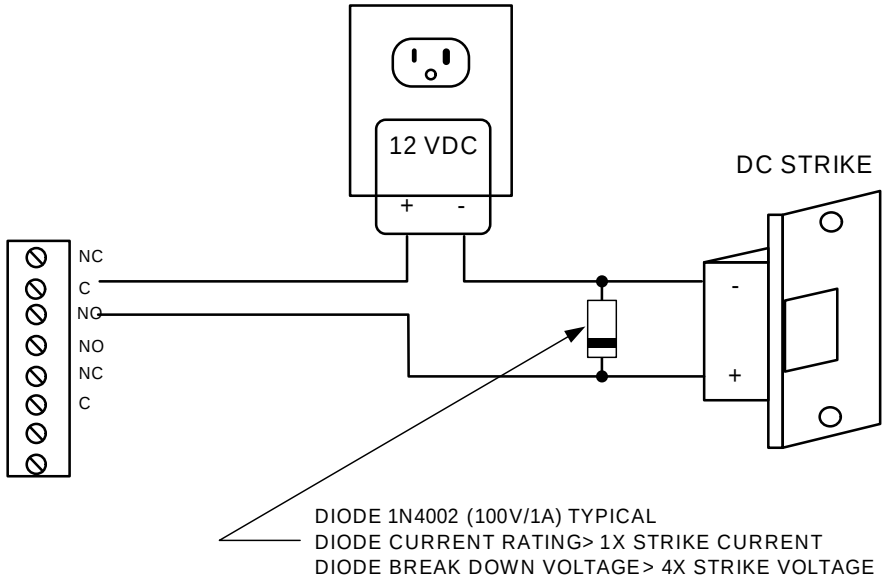
55.1.3 Relay Outputs

The Single Reader Interface Module contains two (2) form-C dry-contact relay outputs, K1 and K2. K1 provides up to 5A 30 VDC; K2 provides up to 1A 30 VDC.

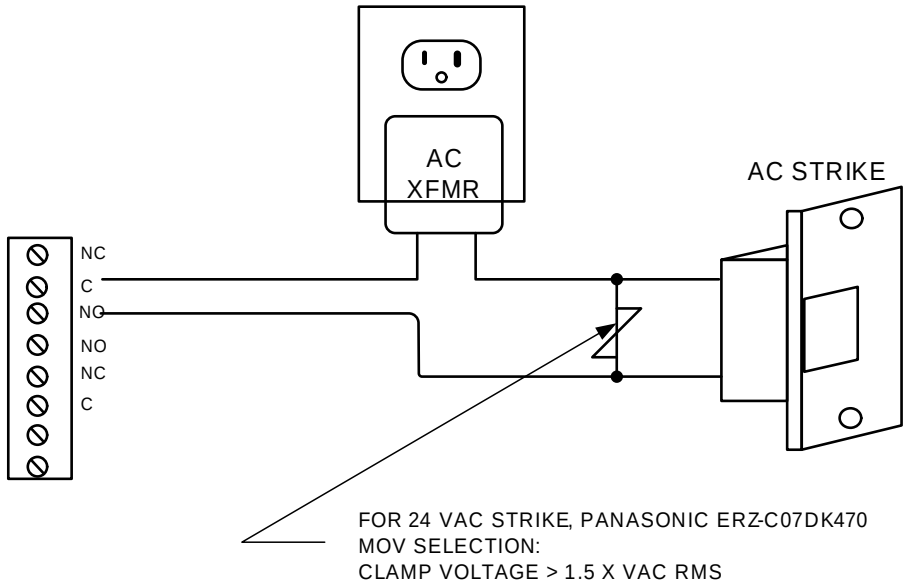
To wire the K1 and K2 outputs, use sufficiently large wires for the load to avoid voltage loss.

Transient clamping must be provided to protect the output contacts and to reduce EMI emissions. For AC-powered devices, use MOV across the load. For DC-powered devices, use a diode across the load.

Relay Contact (DC Strike)



Relay Contact (AC Strike)



55.1.4 Downstream Reader Communication

The Single Reader Interface Module can communicate downstream with one (1) keypad or card reader. The J1 interface is a six-wire interface that includes a buzzer control wire and an LED control wire. The buzzer wire is an open collector that produces 5 VDC open circuit maximum, and 10 mA sink maximum. The LED wire provides between 0.05 and 3 V, 5 mA source/sink maximum.

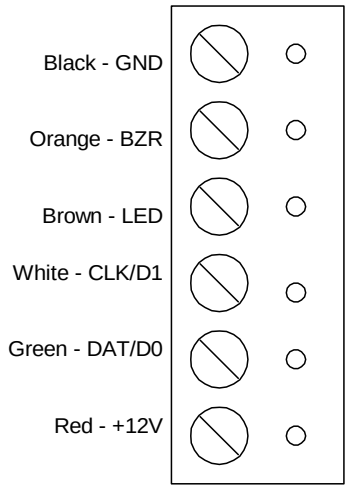
Wire the J1 interface using a 24 AWG (minimum) cable at a maximum of 500 feet (152.4 m).

The reader power is a maximum of 80 mA. If the reader requires additional current, connect the reader power to a +12 VDC terminal on the Single Reader Interface Module.

If you are connecting the reader to a dual reader interface module, each wire should be attached to the associated connection on the Dual Reader Interface Module board (LNL-1320).

All readers that have a buzzer will beep during pre-alarm when in extended held open mode. This includes primary and alternate readers. If the reader has two-wire LED control, this feature is disabled. The reader starts beeping at pre-alarm time and continues to do so until the door is closed or the held open time is hit.

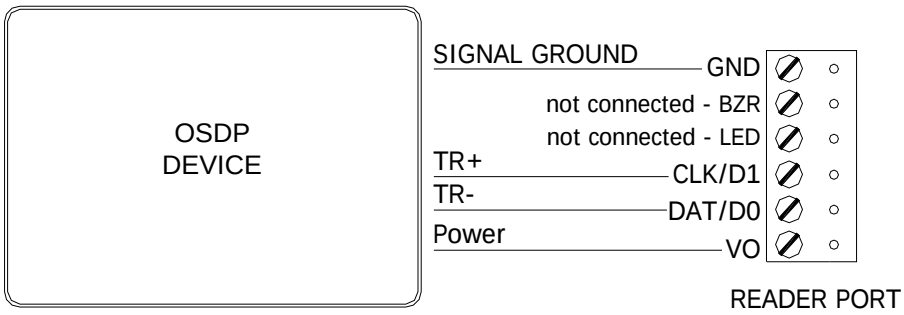
Reader/Single Interface Module Downstream Wiring



55.1.5 Open Supervised Device Protocol

Open Supervised Device Protocol (OSDP) uses bi-directional communications between readers and the reader interface, providing constant monitoring of reader health, improved control of reader operation and configuration in real-time, and additional communications capabilities over a single connection, including biometric template download and LCD reader display control.

Wiring for OSDP readers



55.1.6 Power

The Single Reader Interface Module requires a filtered 12 VDC ± 15% power source for its power input. The power source must provide isolated and non-switching, linear regulated DC power, with 125 mA current.

Wire the power input with 18 AWG (minimum) twisted pair cable.

Notes:
- Be sure to observe polarity.
- Do not use an AC transformer to directly power the Single Reader Interface Module.
- In older models of this hardware, the 12 VDC is passed to the TTL modular jack and is available for powering a keypad or reader (80 mA maximum).

55.2 Elevator Control

OnGuard hardware is capable of supporting elevator control for up to 128 floors. An elevator reader has an input/output module that controls the access to floors via an elevator.

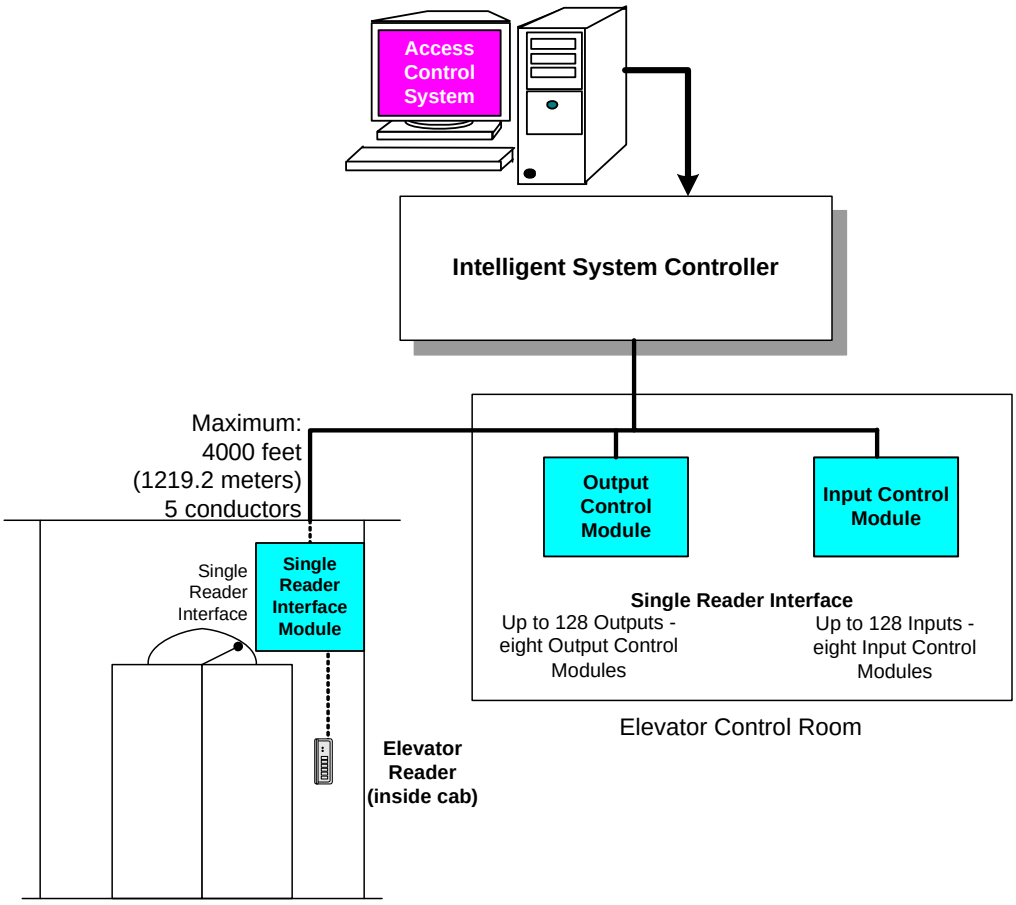
The OnGuard software must be configured for elevator control. This can be done from System Administration by selecting the **Elevator** check box on the General tab in the Readers and Doors form. The reader's type, name, port, address, and access panel can all be defined here as well.

Note: In order for this check box to be available, the access panel to which this reader module is connected must have **Elevator support** enabled on the Options tab.

With elevator control on the LNL-1300 reader, door strike and contact are not available, and REX (Request to EXit) is disabled.

Addresses assigned to input/output panels do not need to be consecutive. On the first panel, the inputs/outputs represent the first sixteen floors (e.g.: Input 1 = first floor, Input 2 = second floor, etc.). The second panel represents the next sixteen floors (floor 17 through 32), etc.

Overview of Elevator Control



56 Configuration

The Single Reader Interface Module board contains 9 jumpers that must be configured for your system.

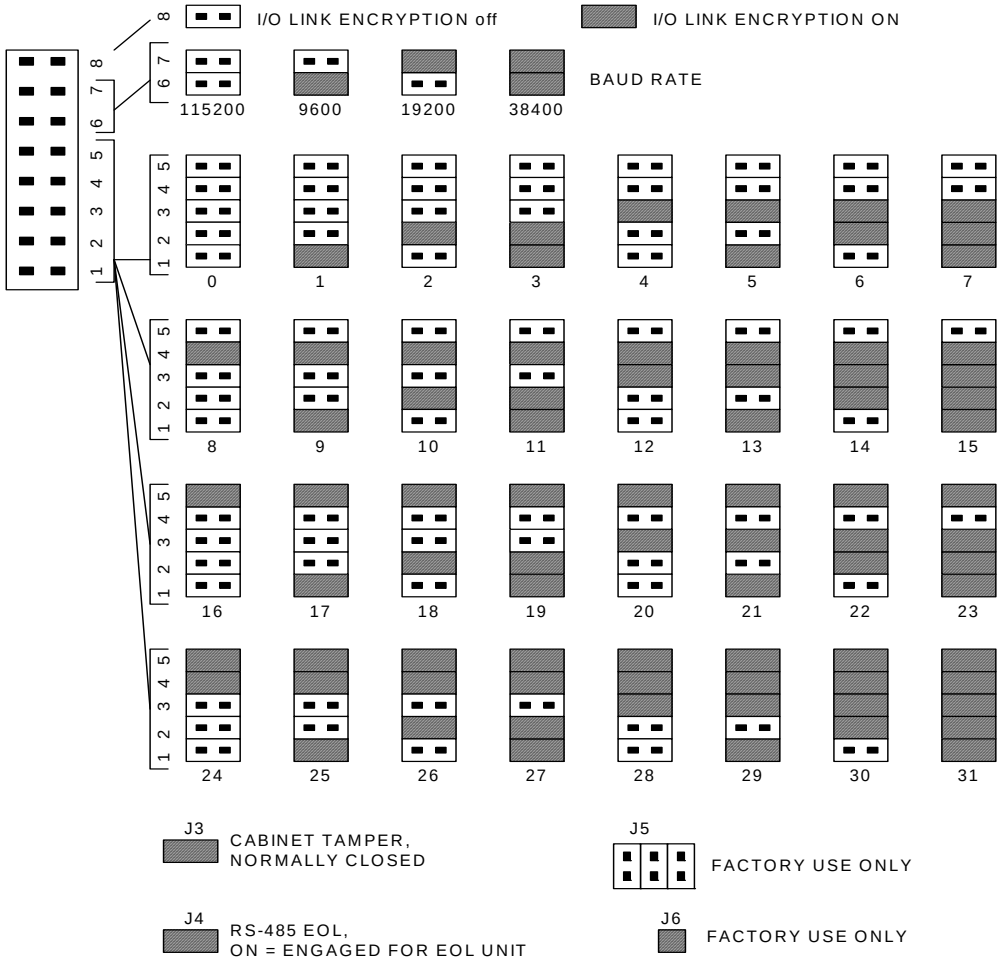
56.1 Installing Jumpers

The following chart describes the use of each jumper.

JUMPER(S)	USED TO CONFIGURE:
1,2,3,4,5	Device communication address (0 - 31)
6,7	Communication baud rate (38400, 19200, 9600, or 2400 bps)
8	Downstream encryption (available with OnGuard 2010 or later)

The diagram below shows the Jumper(s) configuration for the device communication address, communication baud rate, and RS-485 termination status.

Jumper Configurations



56.1.1 Device Address

To configure the device communication address, set jumpers 1, 2, 3, 4, and 5 according to the following table.

ADDRESS	JUMPER				
	1:	2:	3:	4:	5:
0	off	off	off	off	off
1	ON	off	off	off	off
2	off	ON	off	off	off
3	ON	ON	off	off	off
4	off	off	ON	off	off
5	ON	off	ON	off	off
6	off	ON	ON	off	off
7	ON	ON	ON	off	off
8	off	off	off	ON	off
9	ON	off	off	ON	off
10	off	ON	off	ON	off
11	ON	ON	off	ON	off
12	off	off	ON	ON	off
13	ON	off	ON	ON	off
14	off	ON	ON	ON	off
15	ON	ON	ON	ON	off
16	off	off	off	off	ON
17	ON	off	off	off	ON
18	off	ON	off	off	ON
19	ON	ON	off	off	ON
20	off	off	ON	off	ON
21	ON	off	ON	off	ON
22	off	ON	ON	off	ON
23	ON	ON	ON	off	ON
24	off	off	off	ON	ON
25	ON	off	off	ON	ON
26	off	ON	off	ON	ON

ADDRESS	JUMPER				
	1:	2:	3:	4:	5:
27	ON	ON	off	ON	ON
28	off	off	ON	ON	ON
29	ON	off	ON	ON	ON
30	off	ON	ON	ON	ON
31	ON	ON	ON	ON	ON

56.1.2 Communication Baud Rate

To configure the communication baud rate, set jumpers 6 and 7 according to the following table.

BAUD RATE:	JUMPER	
	6:	7:
38400 bps	ON	ON
19200 bps	off	ON
9600 bps	ON	off
2400 bps	off	off

Currently, OnGuard only supports a baud rate of 38400 bps, so be sure to set both 6 and 7 to the ON position.

56.1.3 Communication Password Status

Jumper 8 controls the utilization of encryption.

PASSWORD STATUS	DIP SWITCH 8: (OnGuard 2009 or later)	DIP SWITCH 8: (prior to OnGuard 2009)
Encryption is optional	off	Normal operation
Encryption is required	ON	Not allowed

When jumper 8 is ON, communication will not be allowed unless the access panel supports downstream encryption and is configured to enable encryption to this device.

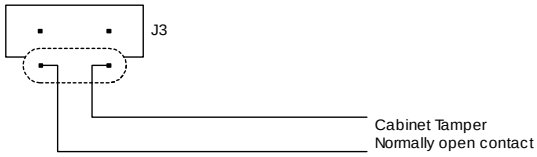
When jumper 8 is off, the device will accept either encrypted or unencrypted communication. It must be off if the access panel does not support downstream encryption, or if downstream encryption is disabled for this device.

56.1.4 Cabinet Tamper

Jumper J3 is used to configure cabinet tamper. There are two possible configuration options: On or Off. When J3 is on, cabinet tamper is bypassed. When it is off, it must be wired in order to work.

J3 in ON position (Cabinet Tamper is bypassed)

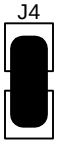
J3 in OFF position (requires wiring)



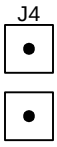
56.1.5 EOL Termination

Jumper J4 is used to configure the EOL termination status the Single Reader Interface Module board. There are two possible configuration options that can be used to install this jumper: “On” and “Not On.”

Termination ON position for J4



Termination OFF position for J4



57 Specifications

The LNL-1300 series 2 is for use in low voltage, class 2 circuits only.

- Primary power: 12 to 24 VDC + 10%, 150mA maximum (plus reader current)
  - 12 VDC @ 110mA (plus reader current) nominal
  - 24 VDC@ 60mA (plus reader current) nominal
- Outputs: Form-C contacts: K1: 5A @ 28 VDC, K2: 1A @ 28 VDC
- Inputs:
  - 2 supervised, End of Line resistors, 1k/1k ohm, 1% 1/4 watt standard
  - 1 unsupervised, dedicated for cabinet tamper
- Reader Interface:
  - Reader power: 12 to 24 VDC ± 10% (input voltage passed through)
  - Reader LED output: TTL compatible, high > 3V, low < 0.5V, 5mA source/sink maximum
  - Buzzer output: Open collector, 5 VDC open circuit maximum, 10mA sink maximum
  - Reader data inputs: TTL compatible inputs or 2-wire RS-485
- Communication: RS-485, 2-wire. 9600, 19200, 38400, or 115200 bps
- Cable requirements:
  - Power: 18 AWG, 1 stranded twisted pair
  - RS-485 24 AWG, 120 ohm impedance, stranded twisted pair with shield, 4000 feet (1219 m) maximum
  - Alarm Inputs: 1 stranded twisted pair per input, 30 ohms maximum
  - Outputs: As required for the load
  - Reader data (TTL): 18 AWG stranded, 6 conductor, 500 feet (152.4 m) maximum
  - Reader data (RS-485): 24 AWG stranded, 120 ohm impedance, twisted pair with shield, 4000 (1,219 m) maximum
- Mechanical:
  - Dimension: 4.25 x 2.75 x 1.4 in. (108 x 74 x 36 mm)
  - Weight: 4 oz. (120 g) nominal
- Environmental:
  - Temperature: -55 to +85° C storage, -35 to +75° C operating
  - Humidity: 0 to 95% RHNC
- Certifications:
  - UL294 & UL1076 Listed
  - ULC Listed
  - FCC Part 15
  - C-Tick
  - CE marking
  - RoHS compliant
  - WEEE

These specifications are subject to change without notice.

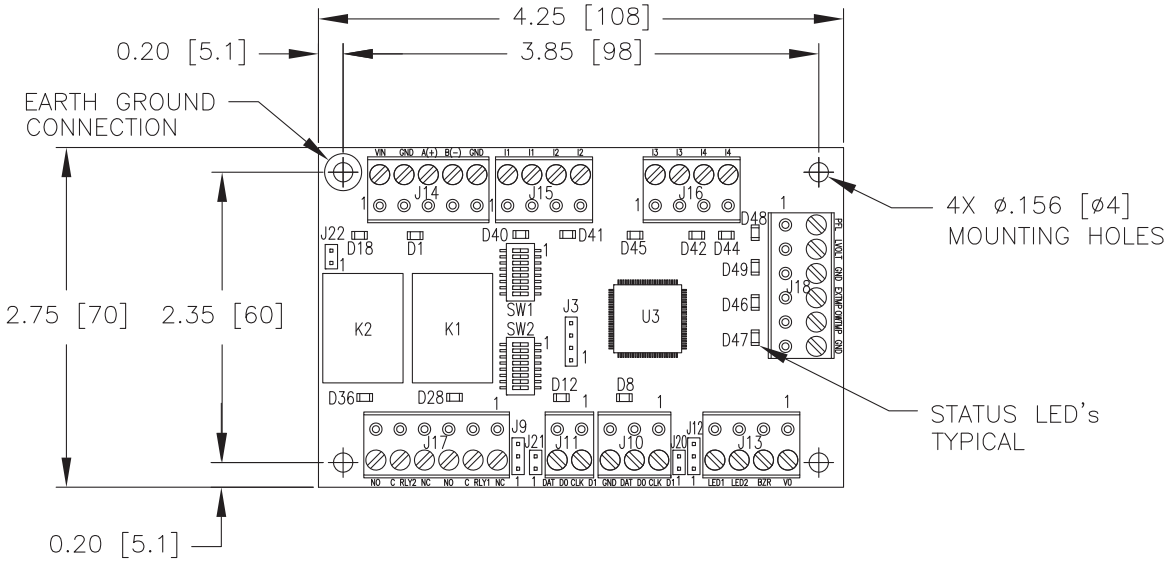
LNL-1300-U
SINGLE DOOR CONTROLLER MODULE

58 Overview of the LNL-1300-U Board

The LNL-1300-U provides a solution for interfacing to a Wiegand/ RS-485 type reader and door hardware. It can accept data from a reader with clock/data, wiegand signaling or 2-wire RS-485 (OSDP), and provides a tri-stated LED control and buzzer control. Two form-C relay outputs may be used for strike control or alarm signaling. Two supervised inputs are provided for monitoring the door contact and exit push button.

Communication to the interface is accomplished via a 2-wire RS-485 interface. It requires a 12 to 24 VDC power source.

SDC board (Dimensions are in inches [mm])



58.1 Package Contents

- LNL-1300-U board
- 1000 ohm resistors

59 Installation

To install the SDC, perform the installation procedures described in the following sections, in the order in which they are presented.

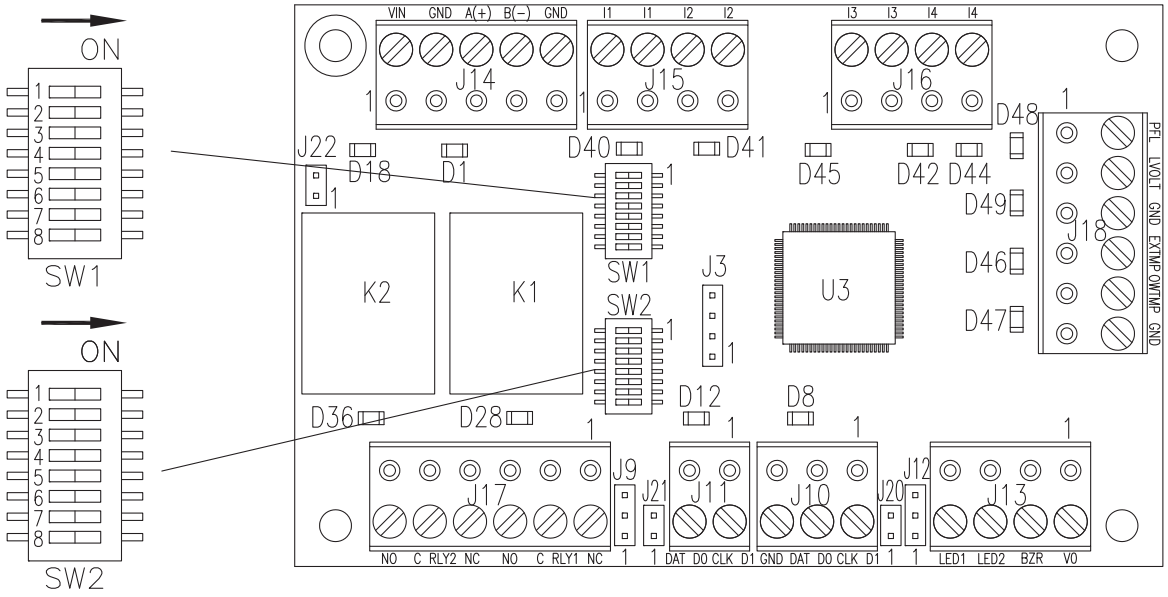
1. Set baud rate (SW1), address (SW2), and LED control switches.
2. Install jumpers.
3. Mount the board into the enclosure.
4. Wire the supervised alarm inputs for door position and REX exit push button monitoring.
5. Wire the upstream host communication.
6. Wire the relay outputs for door strike and AUX.
7. Wire the downstream interface for the keypad or card reader.
8. Wire tamper input.
9. Wire power and communications inputs.
10. Validate proper operation on power up.

60 Configuration

The Single Reader SDC Interface Module board contains two (2) 8-position DIP switches that are user-selectable to control addressing, baud rate, and other functions, and four jumpers used to configure your system.

60.1 Setting DIP Switches

SDC dip switches



60.1.1 Communication Baud Rate (SW1)

Configure the baud rate using SW1 switches 1-4. (Switch 5 is used for LED control. Switches 6-8 are not used.)

Baud rate	SW1 switch for host		SW1 switch for OSDP readers (Aux ports)	
	1:	2:	3:	4:
2400 bps	off	off	off	off
9600 bps	ON	off	ON	off
19200 bps	off	ON	off	ON
38400 bps	ON	ON	ON	ON

Note: If you are not using OSDP readers, SW1 switch 3 & 4 do not need to be set as indicated here.

LED Mode

SW1 switch 5 is used for LED control. It is read at boot time. If you make a change to this setting, be sure to restart.

SW1 Switch 5	State
ON	LEDs behave as the Access (LNL) series module.
off	LED behavior is in Normal Mode

60.1.2 Device Address (SW2)

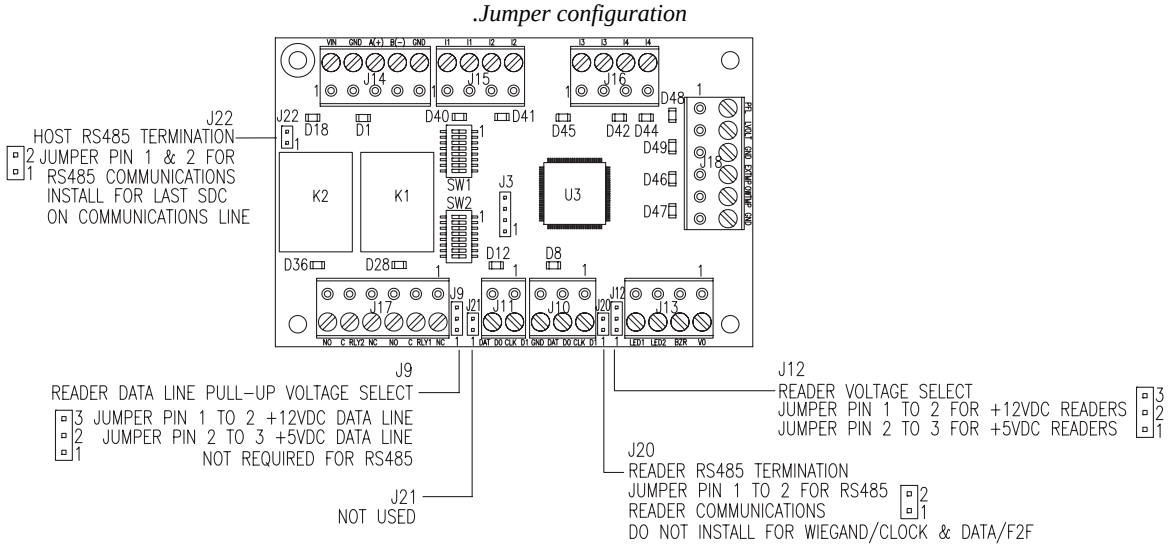
Configure the board address using SW2. (Switches 6-8 are not used.)

Address	SW2 switch				
	1:	2:	3:	4:	5:
0	off	off	off	off	off
1	ON	off	off	off	off
2	off	ON	off	off	off
3	ON	ON	off	off	off
4	off	off	ON	off	off
5	ON	off	ON	off	off
6	off	ON	ON	off	off
7	ON	ON	ON	off	off
8	off	off	off	ON	off
9	ON	off	off	ON	off
10	off	ON	off	ON	off
11	ON	ON	off	ON	off
12	off	off	ON	ON	off
13	ON	off	ON	ON	off
14	off	ON	ON	ON	off
15	ON	ON	ON	ON	off
16	off	off	off	off	ON
17	ON	off	off	off	ON

Address	SW2 switch				
	1:	2:	3:	4:	5:
18	off	ON	off	off	ON
19	ON	ON	off	off	ON
20	off	off	ON	off	ON
21	ON	off	ON	off	ON
22	off	ON	ON	off	ON
23	ON	ON	ON	off	ON
24	off	off	off	ON	ON
25	ON	off	off	ON	ON
26	off	ON	off	ON	ON
27	ON	ON	off	ON	ON
28	off	off	ON	ON	ON
29	ON	off	ON	ON	ON
30	off	ON	ON	ON	ON
31	ON	ON	ON	ON	ON

60.2 Installing Jumpers

.Jumper configuration


J22
HOST RS485 TERMINATION
JUMPER PIN 1 & 2 FOR
RS485 COMMUNICATIONS
INSTALL FOR LAST SDC
ON COMMUNICATIONS LINE
J9
READER DATA LINE PULL-UP VOLTAGE SELECT
JUMPER PIN 1 TO 2 +12VDC DATA LINE
JUMPER PIN 2 TO 3 +5VDC DATA LINE
NOT REQUIRED FOR RS485
J21
NOT USED
J12
READER VOLTAGE SELECT
JUMPER PIN 1 TO 2 FOR +12VDC READERS
JUMPER PIN 2 TO 3 FOR +5VDC READERS
J20
READER RS485 TERMINATION
JUMPER PIN 1 TO 2 FOR RS485
READER COMMUNICATIONS
DO NOT INSTALL FOR WIEGAND/CLOCK & DATA/F2F

Host communications:

- Jumper J22 pins 1 & 2 for RS-485 reader communications. Install the jumper on last the SDC on the communications line.

Reader output voltage selection:

- Jumper J12 pins 1 & 2 for +12VDC readers
- Jumper J12 pins 2 & 3 for +5VDC readers

Reader RS-485 termination:

- Jumper J20 pins 1 & 2 for RS-485 reader communications

Note: Do NOT install the jumper for Wiegand/Clock & Data/F2F Reader Communications.

Reader data line pull-up voltage selection:

- Jumper 9 pins 1 & 2 for +12VDC data lines
- Jumper 9 pins 2 & 3 for +5VDC data lines

Notes: Some readers have data lines pulled up to +5 while the data lines of other readers are pulled up to +12 VDC. Therefore, you need to set these to match your reader.

NOT required for RS-485 communications.

Jumper J21 is not used.

60.3 Status LEDs

60.3.1 LED Table for Series 2 LNL-1300 Mode

When switch 5 is in the ON position, the LEDs behave like the series 2 LNL-1300.

Indication	LED	State
Power-up	ALL	Off
Initialization	D45	Flashing
After initialization	D45	Offline: 1 second rate, 20% ON Online: 1 second rate, 80% ON
Communications	D1	ON

60.3.2 LED Table for Normal Mode

When SW1 switch 5 is in the off position, the LEDs operate in Normal Mode.

External tamper (cabinet tamper) must be open for Input LEDs to be on. When tamper is closed (cabinet door closed) Input LEDs will be off.

Indication	LED	State
RS-485 panel communication	D1	ON - Yellow
Reader 1 RS-485 communication	D8	ON - Yellow
Power on	D18	ON - Green
Relay 1	D28	ON - Green
Relay 2	D36	ON - Green
Supervised input I1-I2	D40, D41	Active: ON - Yellow Inactive: ON - Green Foreign: ON - Red Cut: Flashing - Green Short: Flashing - Red Ground: Flashing - Yellow
Unsupervised I1-I2	D40, D41	Closed ON - Red, Open - Off
CPU status	D45	Offline: 1 second rate, 20% ON Online: 1 second rate, 80% ON Flash Green - Badge Read
External (cabinet) tamper	D46	Open ON - Red
Power fail	D48	ON - Red

CPU status LED D45 possible module error conditions for LED Normal and Series 2 modes:

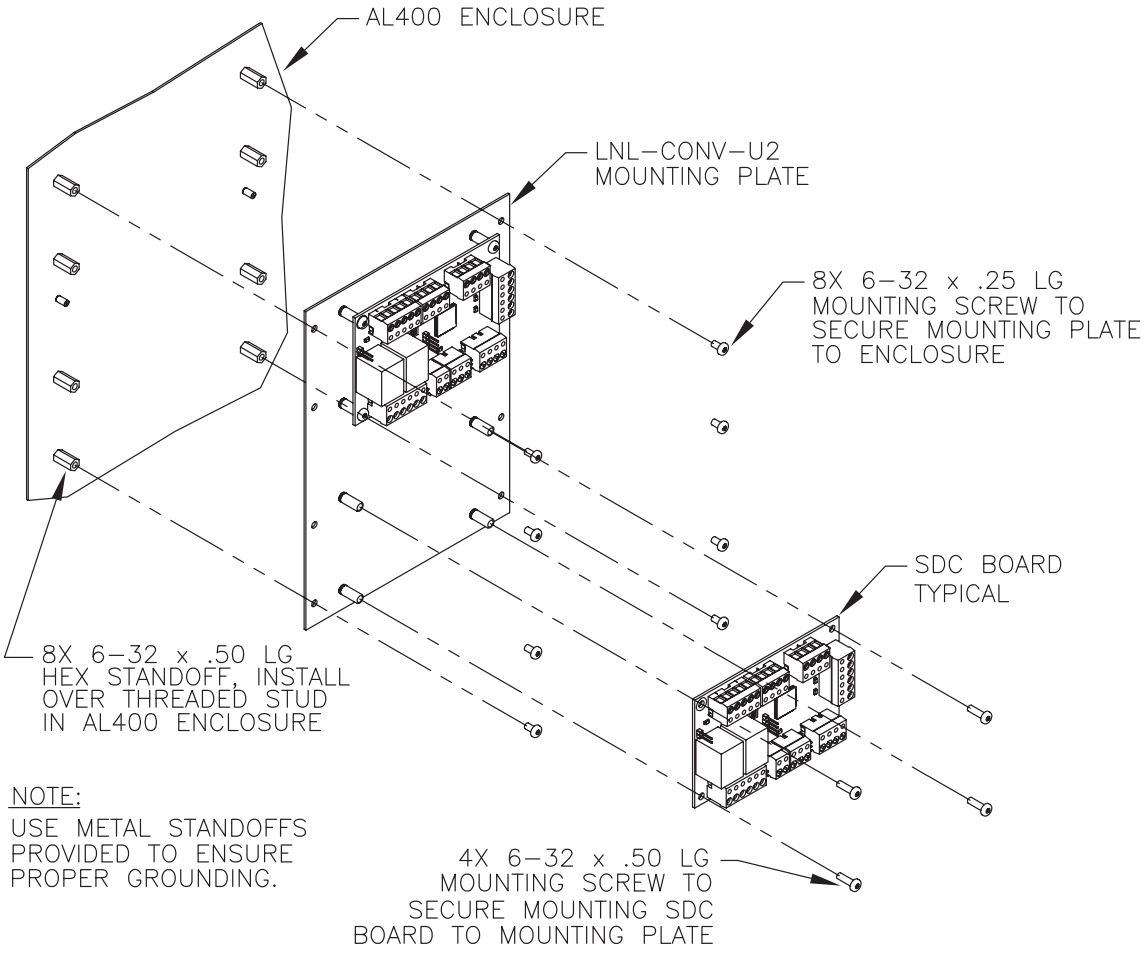
Error condition	Flashing pattern	Description
No valid application firmware	3 Red, 2 Green	The module is not operational. Firmware must be loaded using a console, e.g. HyperTerminal with Xmodem.
Boot loader waiting on firmware file	3 Red, 1 Green	Console boot loader is waiting on start of firmware file.
Boot loader loading firmware file	2 Red, 2 Green	Console boot loader is loading a firmware file.
Invalid EFL file	1 Red, 2 Green	The EFL specified to be loaded using the console loader is not a valid EFL file.
Invalid Xmodem packet	1 Red, 1 Green	The console loader received an invalid Xmodem packet and terminated the firmware download operation.

Error condition	Flashing pattern	Description
Invalid Application firmware for module CPU	3 Red, 0 Green	The module is not operational. Application firmware loaded on the module will not run properly. Requires new firmware be loaded using the console boot loader or the module must be returned for repair.
Invalid Boot firmware for module CPU	2 Red, 3 Green	The module is not operational. Boot loader firmware loaded on the module will not run properly. The module must be returned for repair.
Firmware update failed	1 Red, 3 Green	Firmware update operation was unsuccessful. Retry and if it fails continuously, load a different firmware file.
No valid primary firmware copy	3 Green, 2 Red	The firmware flash contains 2 copies of the application firmware. The primary copy is not valid so the backup copy will be loaded into the primary copy and executed.
No valid backup firmware copy	3 Green, 1 Red	The firmware flash contains 2 copies of the application firmware. The backup copy is not valid so the primary copy will be loaded into the backup copy.
No valid manufacturing parameters	3 Green, 0 Red	The manufacturing parameters which include the serial number, etc. are invalid. The module must be returned for repair.

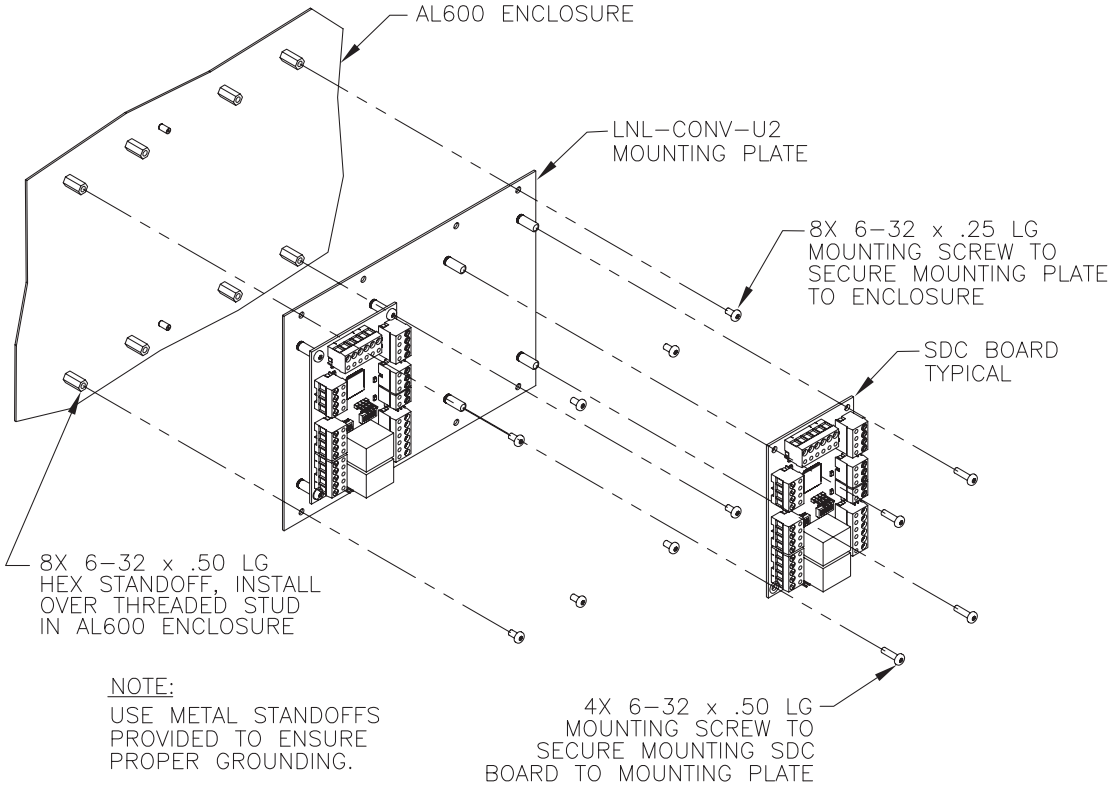
61 Mounting

The SDC can be mounted in the LNL-AL400ULX or LNL-AL600ULX-4CB6 and the LNL-CTX or LNL-CTX6 enclosure using the Universal Mounting Plate (UMP) LNL-CONV-U2. The universal mounting plate can hold up to two (2) LNL-1300-U modules.

Mounting the SDC in the LNL-AL400ULX and LNL-CTX


AL400 ENCLOSURE
LNL–CONV–U2 MOUNTING PLATE
8X 6–32 x .25 LG MOUNTING SCREW TO SECURE MOUNTING PLATE TO ENCLOSURE
SDC BOARD TYPICAL
8X 6–32 x .50 LG HEX STANDOFF, INSTALL OVER THREADED STUD IN AL400 ENCLOSURE
NOTE:
USE METAL STANDOFFS PROVIDED TO ENSURE PROPER GROUNDING.
4X 6–32 x .50 LG MOUNTING SCREW TO SECURE MOUNTING SDC BOARD TO MOUNTING PLATE

Mounting the SDC in the LNL-AL600ULX-4CB6 or LNL-CTX6



62 Wiring

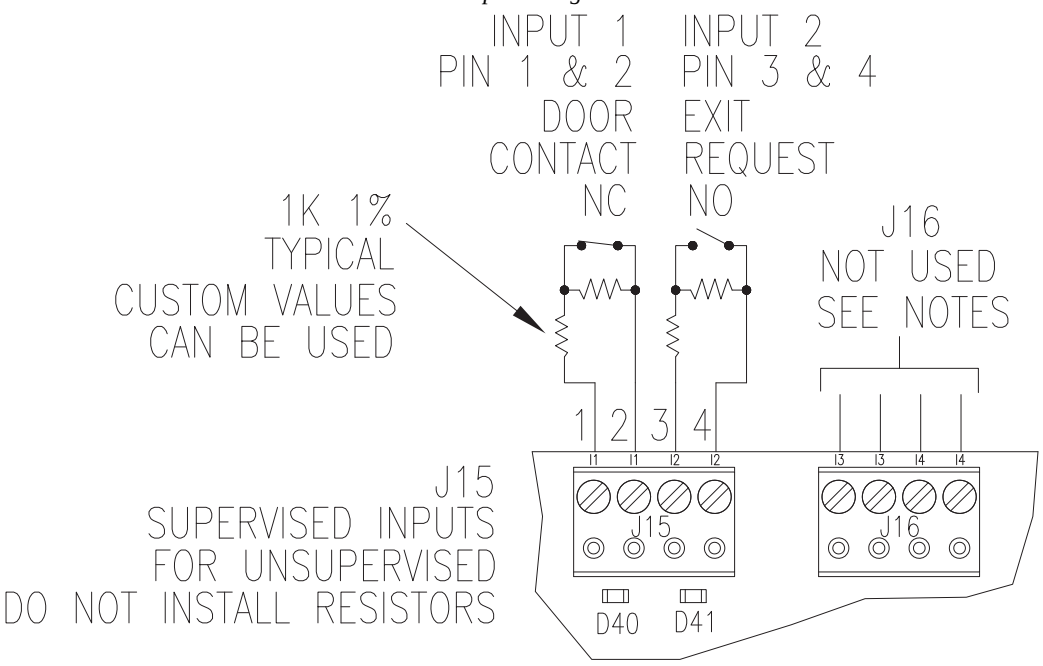
For UL installations, refer to section UL Listed Installations on page 326.

62.1 Supervised (Software Configurable) Alarm Inputs

Wire the I1 and I2 inputs across pins 1 & 2 and 3 & 4 of J15 using a twisted pair cable, 30 ohms maximum. Terminate each of these inputs with two (2) 1k (1000) ohm resistors (1% tolerance - 0.25 watt).

Note: Resistors must be installed as shown in the SDC wiring diagram if the installation requires supervision.

SDC input wiring



The two (2) inputs available on the SDC are software configurable alarm inputs that can be used for alarm device monitoring. Each of these inputs can be configured, via the Access Control software, as either N/O (normally open) or N/C (normally closed) in combination with either supervised or unsupervised wiring. These alarm inputs are connected using Inputs 1 and 2.

Each input that is configured as a supervised alarm must also be terminated with two (2) 1K (1000) ohm resistors (1% tolerance - 1/4 (0.25) watt. N/O and N/C alarms are terminated identically). Resistors are provided with the module.

Install the resistors as close to input device as possible. For cable length limitations, refer to the Specifications section on page 327.

Input Resistor Table

	Alarm Zone Contact NC	Alarm Zone Contact NO
Normal	1K ± 25%	2K ± 25%
Alarm	2K ± 25%	1K ± 25%
Fault - Line Short	0 - 50	0 - 50
Fault - Line Open	15K - ∞	15K - ∞
Fault - Foreign Voltage	50 -750 1250 -1500 2500 -15K	50 - 750 1250 - 1500 2500 -15K

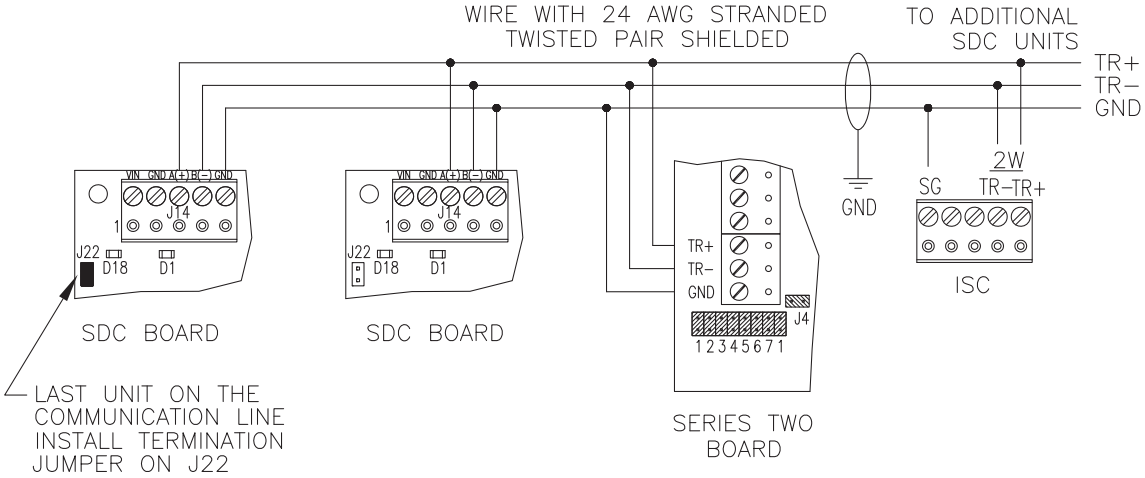
62.2 Upstream Communication

The Single Reader SDC Interface Module uses Port 1 to communicate to the Intelligent System Controller.

Port 1 is a 2-wire RS-485 interface, that requires the following type of RS-485 cable: 24 AWG (minimum) twisted pair (with shields). The main run RS-485 cable should be no longer than 4000 feet [1219 m], 100 ohms maximum (Belden 9841, West Penn, or equivalent). The drop cables (to downstream devices) should be kept as short as possible, no longer than 10 feet.

The RS-485 communication is asynchronous, half-duplex, using 1 start bit, 8 data bits, 1 stop bit.

SDC upstream wiring



Notes: The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distances (4000 feet [1219 m]). The RS-485 interface uses a balance of

differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances, End-Of-Line (EOL) termination is required.

RS-485 must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has an on-board terminator. The installer should determine which device is at the end of the communication line.

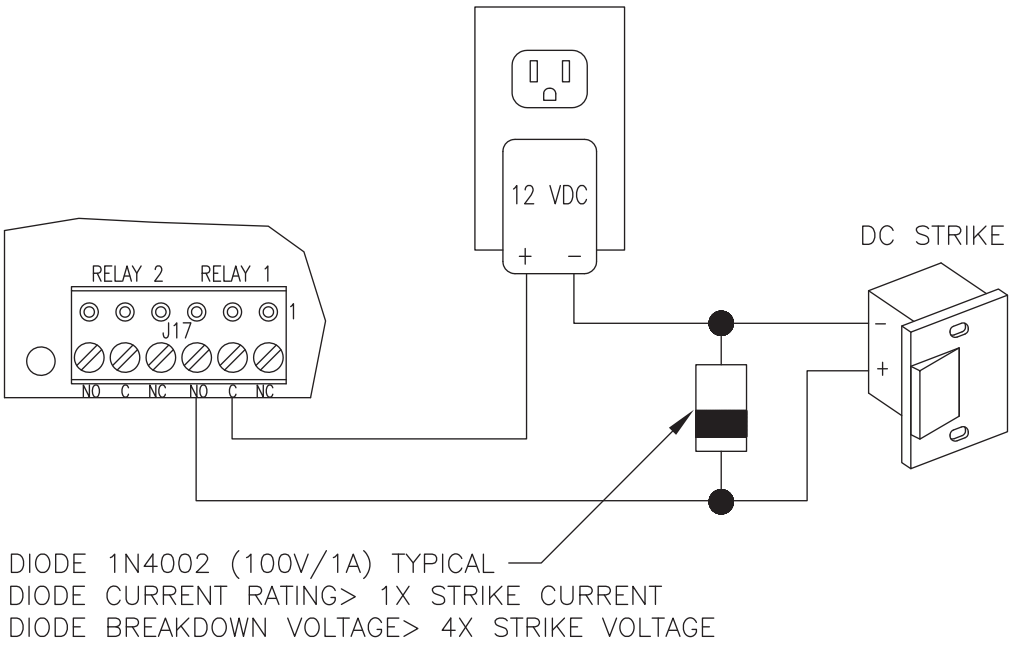
62.3 Relay Outputs

The Single Reader SDC Interface Module contains two (2) form-C dry-contact relay outputs, Relay 1 & 2 (K1 & K2). K1 is rated at 5A 30 VDC; K2 is rated at 1A 30 VDC.

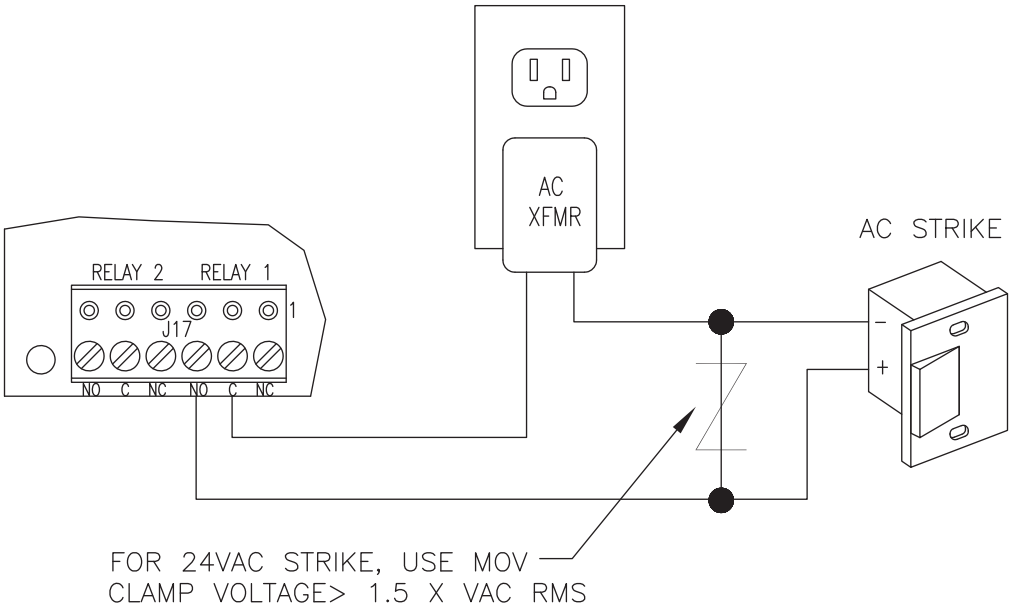
To wire the K1 and K2 outputs, use sufficiently large wires for the load to avoid voltage loss.

Transient clamping must be provided to protect the output contacts and to reduce EMI emissions. For AC-powered devices, use MOV across the load. For DC-powered devices, use a diode across the load.

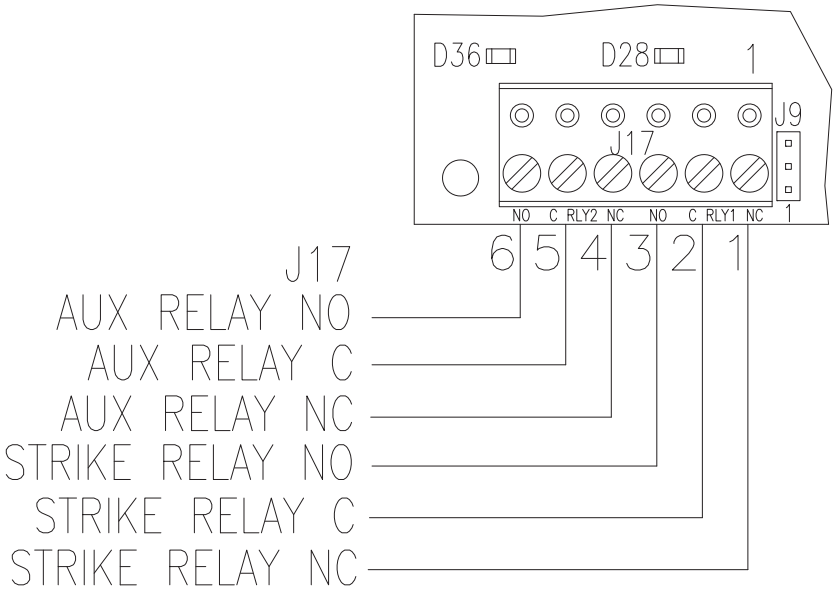
Relay Contact (DC Strike)



Relay Contact (AC Strike)



SDC AUX relay wiring



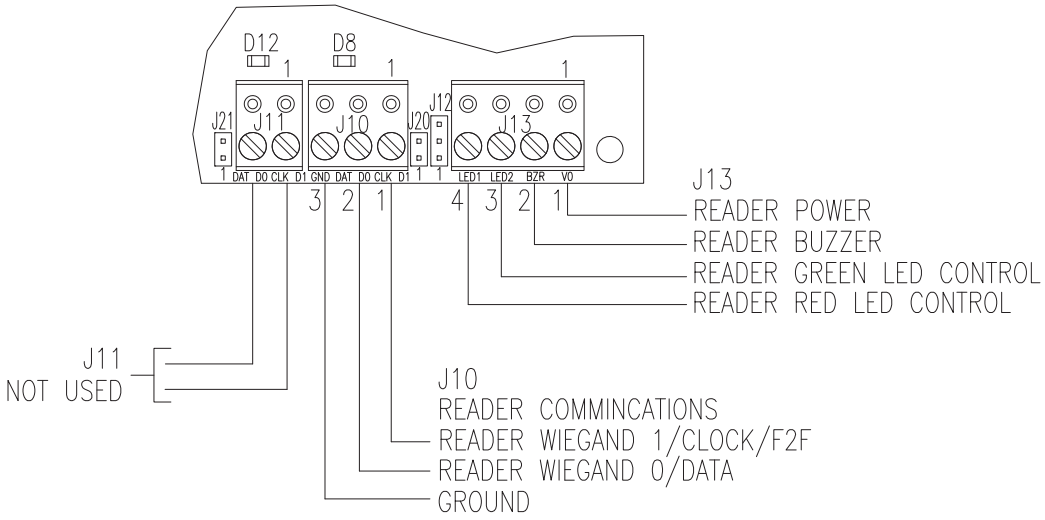
62.4 Downstream Reader Communication

The Single Reader SDC Interface Module can communicate downstream with one (1) card reader. The interface is six wire that includes buzzer and LED control. The LED and buzzer are both open collector types switching (sinking) 10mA maximum.

Use 18 AWG wire minimum and maximum length of 500 feet [152.4 m].

Reader power: Voltage 12 VDC +/-10% (optional 5 VDC +/-5% jumper selectable, current 400 mA maximum to 50°C, derate to 300 mA for 70°C).

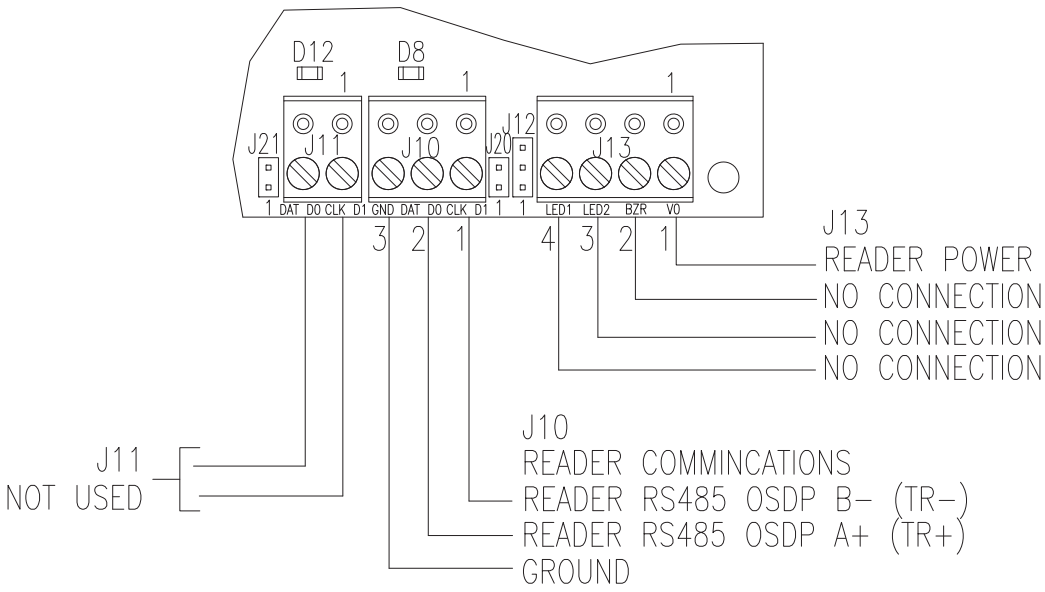
Reader wiring



62.5 Open Supervised Device Protocol

Open Supervised Device Protocol (OSDP) uses bi-directional communications between readers and the reader interface, providing constant monitoring of reader health, improved control of reader operation and configuration in real-time, and additional communications capabilities over a single connection, including LCD reader display control.

Wiring for OSDP readers



62.6 Elevator Control

OnGuard hardware is capable of supporting elevator control for up to 128 floors. An elevator reader has an input/output module that controls the access to floors via an elevator.

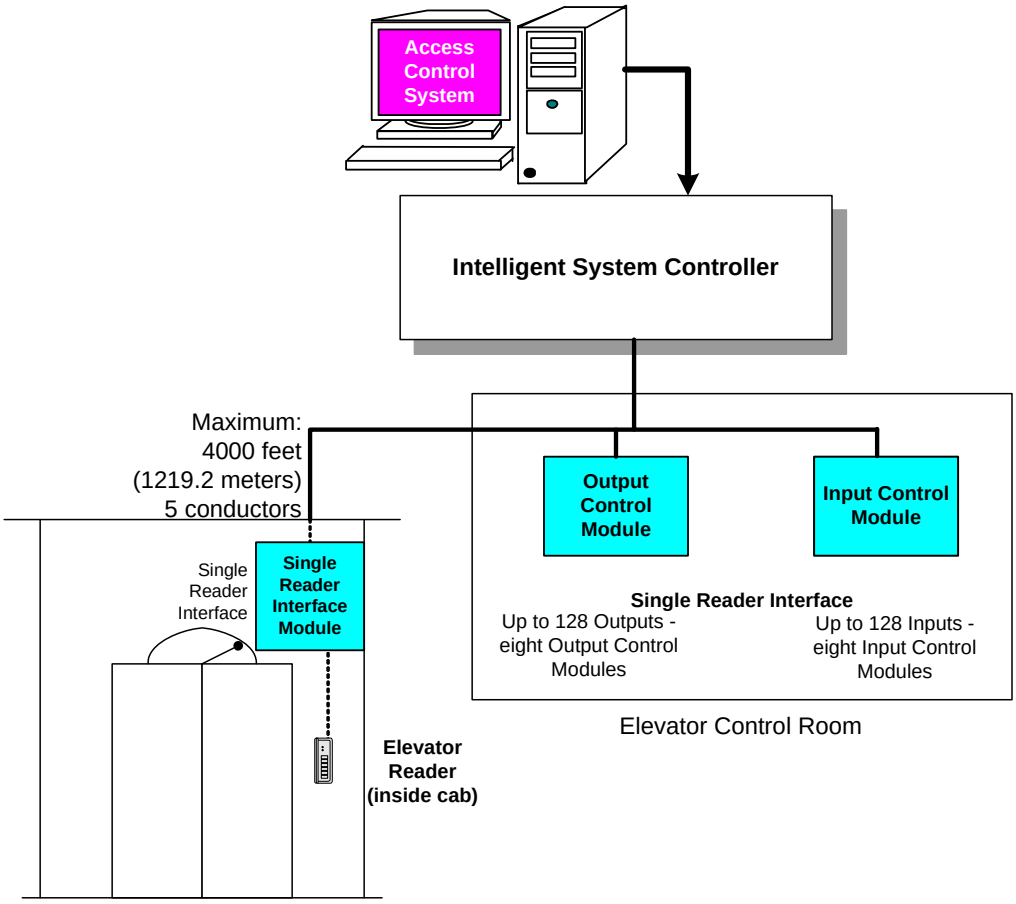
The OnGuard software must be configured for elevator control. This can be done from System Administration by selecting the **Elevator** check box on the General tab in the Readers and Doors form. The reader's type, name, port, address, and access panel can all be defined here as well.

Note: In order for this check box to be available, the access panel to which this reader module is connected must have **Elevator support** enabled on the Options tab.

With elevator control on the LNL-1300 reader, door strike and contact are not available, and REX (Request to EXit) is disabled.

Addresses assigned to input/output panels do not need to be consecutive. On the first panel, the inputs/outputs represent the first sixteen floors (e.g.: Input 1 = first floor, Input 2 = second floor, etc.). The second panel represents the next sixteen floors (floor 17 through 32), etc.

Overview of Elevator Control

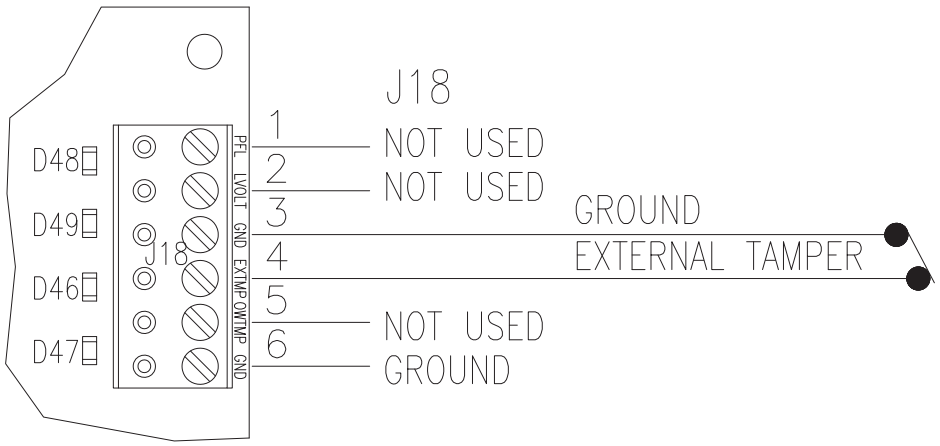


62.7 External (Cabinet) Tamper

An external cabinet tamper (EXTMP) is configured by connecting a tamper device across pins 3 & 4 of J18 on the SDC. If not used, a jumper must be installed across pins 3 & 4 of J18.

Note: Power fail is not supported on the SDC; therefore no jumper is required. This is labeled in the diagram as "NOT USED."

External tamper wiring



Note: Input status LEDs will be off when the tamper device is in closed position or the jumper is installed.

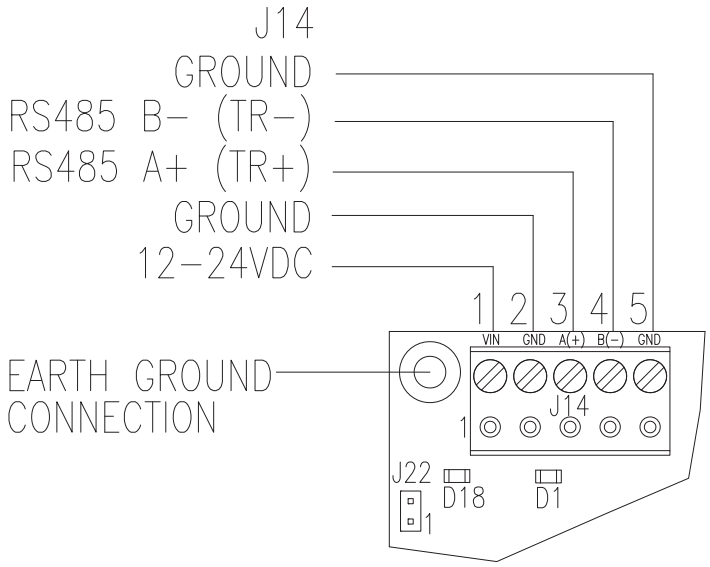
62.8 Power and Communications

For its power input, the SDC requires a 12 to 24 VDC ± 10% power source for it input power.

Wire the power input with 18 AWG (minimum) twisted pair cable.

Power Source	Requirements	Current
DC power source	Isolated, non-switching, regulated DC power	700mA for 12VDC 350mA for 24VDC

Power source wiring



Notes: Be sure to observe polarity.

Do not use an AC transformer to directly power the Single Reader SDC Interface Module.

62.9 UL Listed Installations

For UL Installations, the following must be observed:

- All field wiring terminals are suitable for single wire only.
- Use 22 AWG minimum for wiring of RS-485, Input I1, and reader data.
- Input I2 “Do not supervise for UL” and therefore cannot be used for UL installations.
- RS-485, clock & data reader communications “Not Evaluated by UL” and therefore cannot be used in UL installations.
- RS-485 4-wire is “Not Evaluated by UL” and therefore cannot be used in UL installations.
- The use of AC Strikes is “Not Evaluated by UL” and therefore cannot be used in UL installations.
- Reader power for UL installations: 300 mA maximum for an operating temperature range of -10 to +49°C (14 to 120°F).
- Environmental for UL installations:
  - Temperature: -10 to +49°C (14 to 120°F) operating
  - Humidity: 85+/-5% at 30+/-2°C (86°F)

63 Specifications

Note: For UL installations, refer to section UL Listed Installations on page 326.

The LNL-1300-U is for connection to low voltage, class 2 power-limited circuits only. These specifications are subject to change without notice.

- Primary power:
  - 12 to 24 VDC + 10%
  - 12 VDC @ 700 mA (includes reader current) nominal
  - 24 VDC@ 350 mA (includes reader current) nominal
  - 28.7 BTU/hour
- Outputs: Form-C contacts: Relay 1 and 2 (K1 and K2): 5 A @ 30 VDC
- Inputs:
  - Two (2) supervised, End of Line resistors, 1k/1k ohm, 1% 1/4 watt standard
  - One (1) unsupervised, dedicated for external (cabinet) tamper
- Reader Interface:
  - Reader power: voltage 12 VDC +/-10% (optional 5 VDC +/-5% jumper selectable, current 400 mA maximum to 50°C, derate to 300 mA for 70°C)
  - Reader LED output: open collector type switching (sinking) 10 mA each
  - Buzzer output: open collector type switching (sinking) 10 mA each
  - Reader data inputs: 2-wire RS-485, Wiegand, Clock and Data
- Communication: RS-485, 2-wire. 2400 to 38400 bps
- Cable requirements:
  - Power: 18 AWG, 1 stranded twisted pair
  - RS-485 24 AWG, 120 ohm impedance, stranded twisted pair with shield, 4000 feet [1219 m] maximum
  - Alarm Inputs: 1 stranded twisted pair per input, 30 ohms maximum
  - Outputs: As required for the load
  - Reader data (Wiegand, Clock and Data): 18 AWG stranded, 6 conductor, 500 feet [152.4 m] maximum
  - Reader data (RS-485): 24 AWG, 120 ohm impedance, stranded twisted pair with shield, 4000 [1,219 m] maximum
- Mechanical:
  - Dimension: 4.75 x 2.75 x 1.25 in. [121 x 70 x 32 mm]
  - Weight: 3.5 oz. (100 g) nominal
- Environmental:
  - Temperature: -10 to +70°C (14 to 158°F) operating, -40 to +85°C (-40 to 185°F) storage
  - Humidity: 10% at 93°C (199°F) non-condensing operating, 10 to 95% at 85°C (185°F) non-condensing storage
- Certifications:
  - FCC Part 15
  - ETL 294, s319
  - UL294, 1076
  - C-Tick N22193
  - CE marking

- RoHS
- Environmental class: Indoor dry
- WEEE

LNL-1320 DUAL READER INTERFACE MODULE

64 Overview of the LNL-1320

Lenel offers a Dual Reader Interface (DRI) module for business access control solutions. Up to 64 access control card readers, keypads, or readers with keypads that use standard data1/data0 and clock/data Wiegand communications are supported. Lock/unlock and facility code, off-line access modes are supported on all readers connected to the DRI. Each DRI supports up to eight different card formats as well as issue codes for both magnetic and Wiegand card formats.

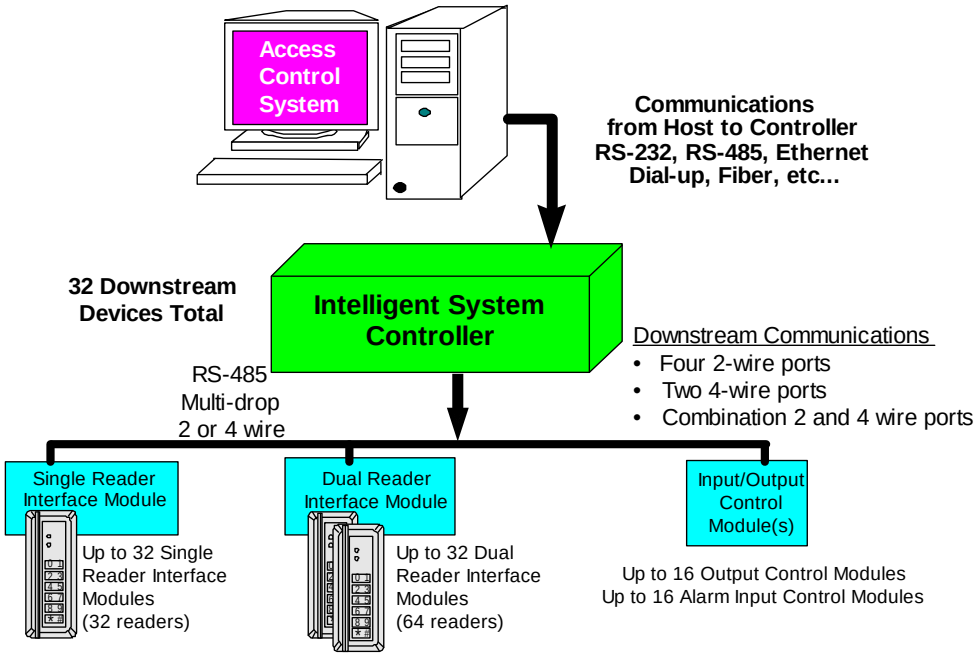
The DRI provides a vital link between the Intelligent System Controller (ISC) and the card reader attached to the interface. As many as 32 DRI modules can be multi-dropped using RS-485 2-wire communication up to 4000 feet per port away from the ISC. Each DRI module is individually addressed for increased reporting capabilities with Access Control software applications. The DRI includes eight (8) programmable inputs that support normally open, normally closed, supervised and non-supervised circuits. Six (6) output relays support fail-safe or fail-secure operation.

The series 2 board differs slightly from the series 1 boards. Where series 2 is indicated, the information only applies to series 2 boards. Otherwise, the information applies to both series 1 and 2 boards.

64.1 Interfaces

The Dual Reader Interface Module interfaces upstream with the Intelligent System Controller, and downstream with two (2) card readers (with or without keypads communicating in either data1/data0 or clock and data).

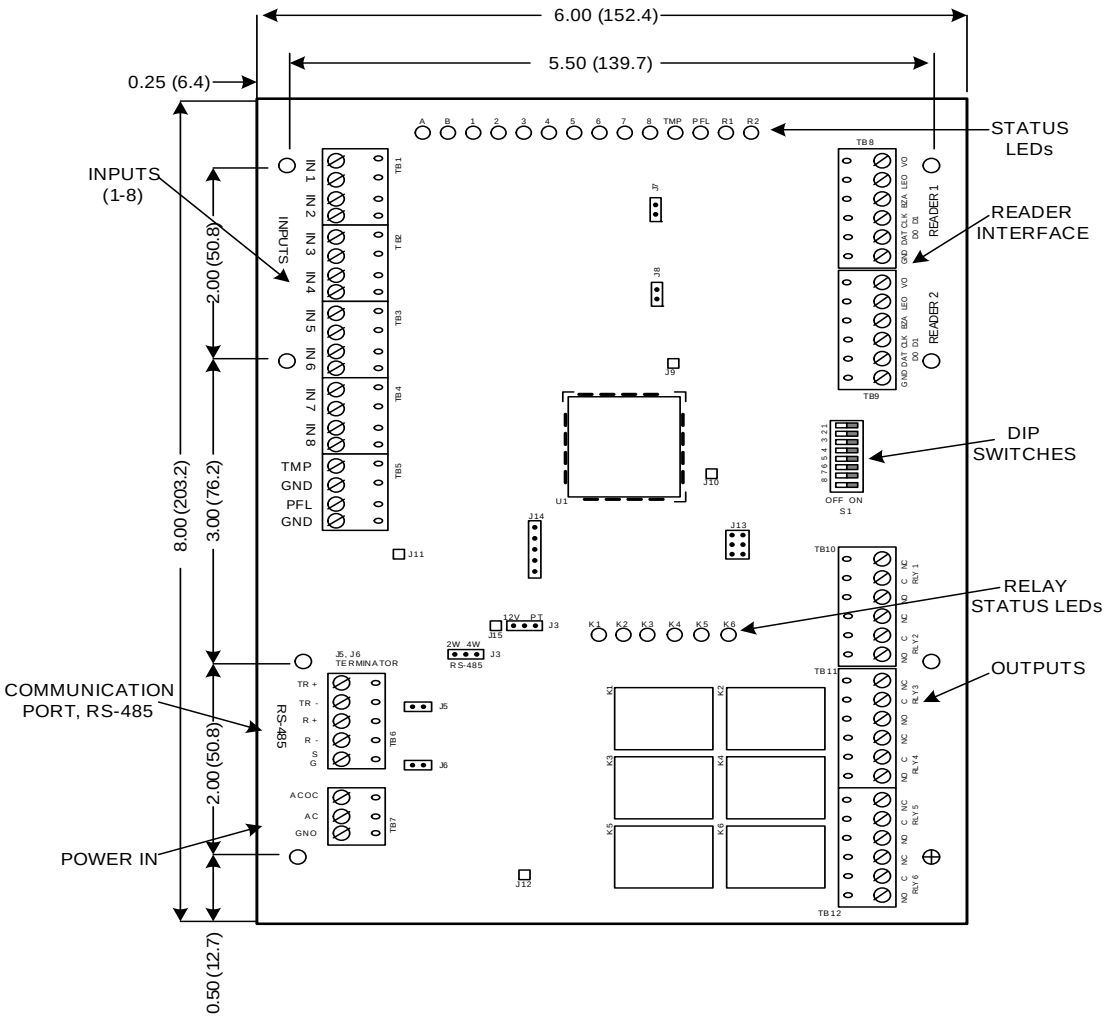
Intelligent System Controller Communications Overview


Access Control System
Communications from Host to Controller
RS-232, RS-485, Ethernet
Dial-up, Fiber, etc...
32 Downstream Devices Total
Intelligent System Controller
Downstream Communications
• Four 2-wire ports
• Two 4-wire ports
• Combination 2 and 4 wire ports
RS-485 Multi-drop 2 or 4 wire
Single Reader Interface Module
Up to 32 Single Reader Interface Modules (32 readers)
Dual Reader Interface Module
Up to 32 Dual Reader Interface Modules (64 readers)
Input/Output Control Module(s)
Up to 16 Output Control Modules
Up to 16 Alarm Input Control Modules

64.2 The Dual Reader Interface Module (Series 2)

The series 2 Dual Reader Interface Module board contains the following components: eight (8) supervised/ non-supervised alarm inputs, one (1) RS-485 interface, two (2) reader interfaces, six (6) relay outputs, one (1) power input, one (1) cabinet tamper, jumpers and eight (8) DIP switches. It also contains several status LEDs and six (6) relay LEDs.

Dual Reader Interface Module



64.2.1 Status LEDs

The series 2 Dual Reader Interface Module board contains LEDs that can be used to verify correct installation after power up.

The A LED is turned on at the beginning of initialization. If the application program cannot be run, the A LED will flash at a rapid rate. The dual reader interface module is waiting for firmware to be downloaded.

When initialization is completed, LEDs A through R2 are briefly sequenced ON then OFF.

After the above sequence, the LEDs have the following meanings:

LED	Purpose
A	This LED is the heartbeat and online status. Offline: 1 second rate, 20% ON Online: 1 second rate, 80% ON
B	Indicates communication activity on the communication port.
1	IN1 input status
2	IN2 input status
3	IN3 input status
4	IN4 input status
5	IN5 input status
6	IN6 input status
7	IN7 input status
8	IN8 input status
TMP	Cabinet tamper
PFL	Power fault

Input in the inactive state: OFF (briefly flashes ON every 3 seconds).

Input in the active state: ON (briefly flashes OFF every 3 seconds).

Input in a trouble state (default): Rapid Flash.

R1: reader port 1:

- Clock/Data Mode: Flashes when data is received, either input.
- Data 0/Data 1 Mode: Flashes when data is received, either input.
- RS-485 Mode: Flashes when transmitting data.

R2: reader port 2:

- Clock/Data Mode: Flashes when data is received, either input.

- Data 0/Data 1 Mode: Flashes when data is received, either input.
- RS-485 Mode: Flashes when transmitting data.

LED K1 through K6: Illuminates when output relay RLY 1 (K1) through RLY 6 (K6) is energized.

64.2.2 Series 1 and Series 2

The following tables list the differences between series 1 and series 2 hardware.

Dual Reader Interface Module

Feature	Series 1	Series 2
Serial number	less than 520,000	520,000 or greater (revision C)
Input power	12 VDC ±10% or 12 VAC ±15%	12 to 24 VDC ±10%
Readhead power	5 VDC, 12 VDC or input voltage pass-through	12 VDC or input voltage pass-through
RS-485 reader interface	Not supported	Supported
Command keypad	TTL signaling	RS-485, currently defaults to address 0, 9600 baud. TTL signaling is not supported.
ISC communication	2-wire or 4-wire RS-485	2-wire RS-485 only
Tamper and power fault wiring	Common ground terminal	Separate ground terminal for each
Status LEDs	2 for board status, 6 for relay status	2 for boards status, 6 for relay status, 8 for alarm input status, 2 for tamper/power fault status, 1 for each reader port communication activity

65 Installation

To install the Dual Reader Interface Module, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the supervised alarm inputs.
2. Wire the upstream host communication.
3. Wire the relay outputs.
4. Wire the downstream TTL interface for the keypads and/or card readers.
5. Wire the Power Fault and Cabinet Tamper Monitors.
6. Wire the power input.

65.1 Wiring

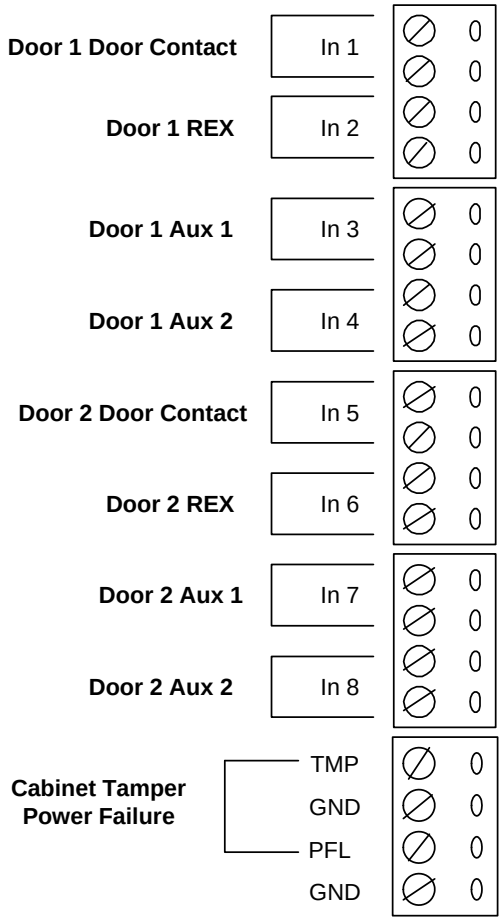
65.1.1 Supervised Alarm Inputs

The Dual Reader Interface Module contains eight (8) supervised inputs that can be used for door position monitoring, REX exit push button monitoring, and alarm control.

These inputs are connected using the IN1, IN2, IN3, IN4, IN5, IN6, IN7, and IN8 inputs. The standard wiring configuration is as follows:

Inputs 1-4 are for Door #1, Inputs 5-8 for Door #2

DRI Alarm Input Contact Wiring

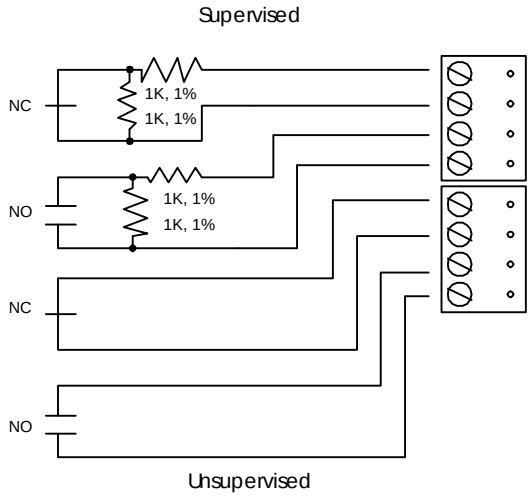


Door Contact	Selectable through software (default – normally closed)
REX	Selectable through software (default – normally open)
Aux.	Selectable through software

Wire the IN1 - IN8 inputs using twisted pair cable, 30 ohms maximum.

Terminate each of these inputs with two (2) 1000-ohm resistors (1% tolerance – 0.25 watt) for supervised inputs.

Alarm Contact Wiring

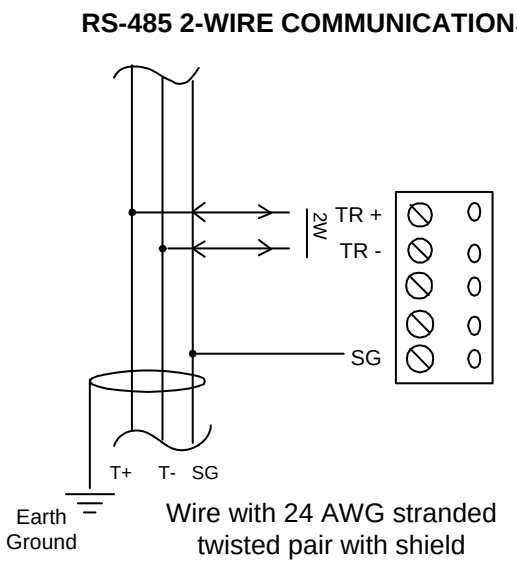


65.1.2 Upstream Communication

The Dual Reader Interface Module uses Port 1 to communicate to the Intelligent System Controller.

Port 1 is a 2-wire RS-485 interface that requires the following type of RS-485 cable: 24 AWG (minimum) twisted pair (with shields). Either 2-wire or 4-wire RS-485 cable configuration can be used for series 1. Only 2-wire RS-485 cable configuration can be used for series 2. The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842 for 4-wire or Belden 9841 for 2-wire, plenum cabling Belden 88102, West Penn, or equivalent). The drop cables (to downstream devices) should be kept as short as possible, no longer than 10 feet.

Upstream Controller Communication Wiring (2-wire)



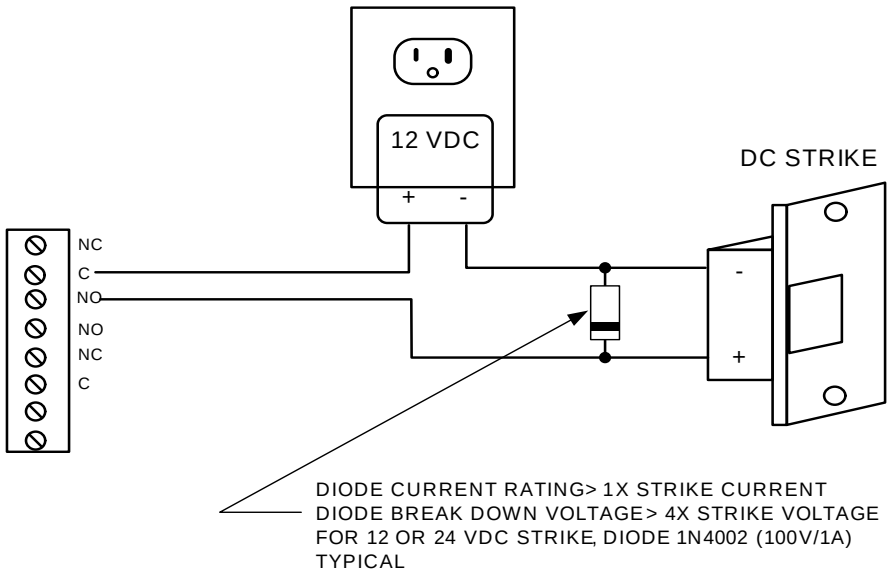
The RS-485 communication is asynchronous, half-duplex, using 1 start bit, 8 data bits, 1 stop bit.

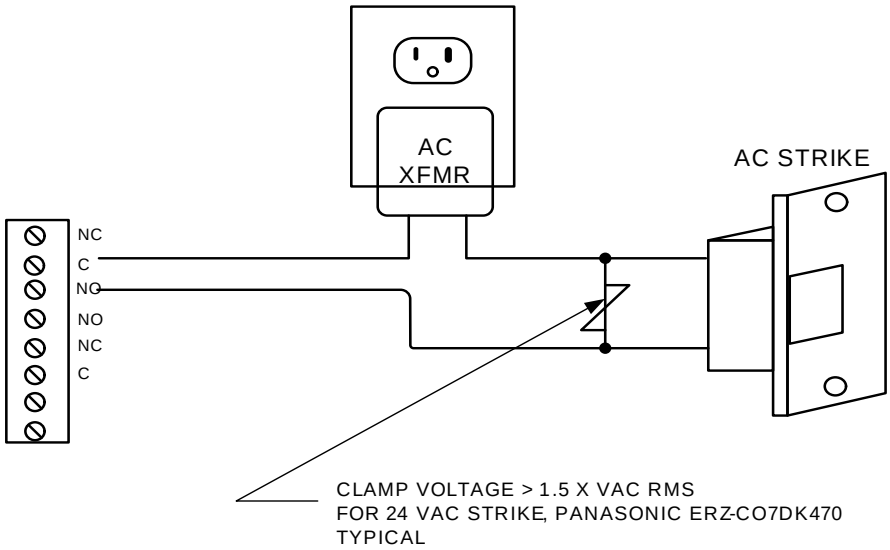
65.1.3 Control Output Wiring

Six form-C contact relays are provided for controlling door strikes or other devices. Load switching can cause abnormal contact wear and premature contact failure. Switching of inductive loads (strike) also causes EMI (electromagnetic interference) which may interfere with normal operation of other equipment. To minimize premature contact failure and to increase system reliability, contact protection circuit must be used. The following two circuits are recommended. Locate the protection circuit as close to the load as possible (within 12 inches [30cm]), as the effectiveness of the circuit will decrease if it is located further away.

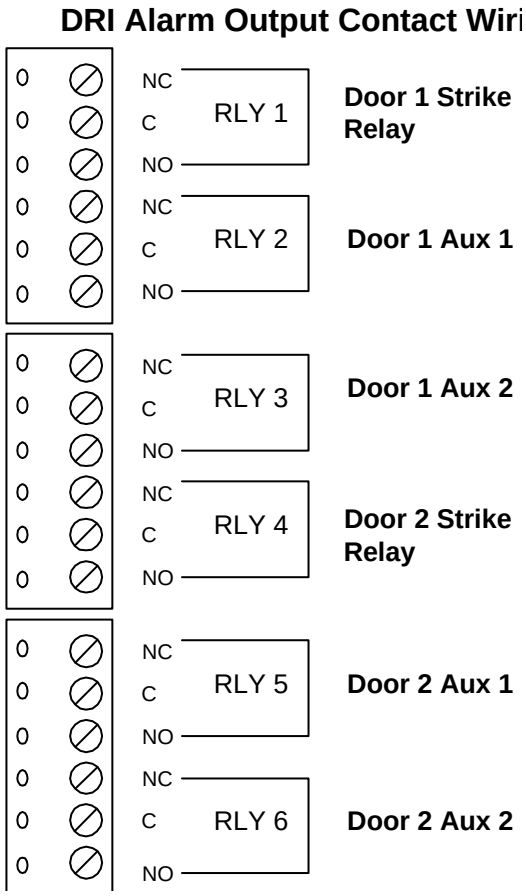
Use sufficiently large gauge of wires for the load current as to avoid voltage loss.

Control Output Wiring





Relay Outputs

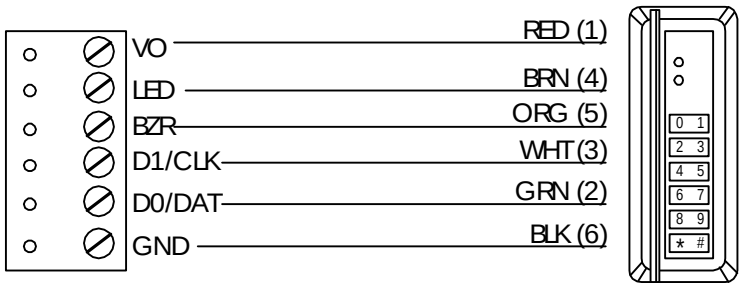


65.1.4 Downstream Reader Communication

Each reader port supports a reader with TTL or RS-485 interface. Power to the reader is selectable: 12 VDC, or input voltage passed through (PT), 125mA maximum per reader port. This selection is made via jumper J2 and is made for both reader ports. For the selection of 12 VDC, the LNL-1320 must be powered by a 20 VDC minimum source. For readers requiring a different voltage or current capability, they must be powered separately.

To fully utilize each reader port, a 6-conductor cable (18 AWG) is required when TTL signaling is used. RS-485 signaling requires two 2-conductor cables. One cable for power (18 AWG) and one cable for communication (24 AWG). Reader port configuration is set via host software.

Typical Reader Wiring

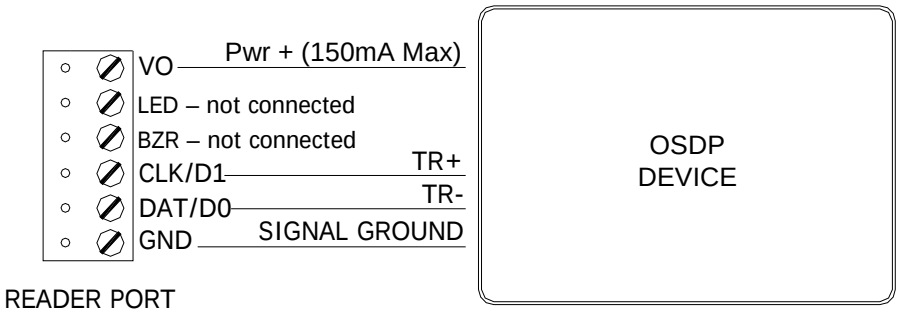


All readers that have a buzzer will beep during pre-alarm when in extended held open mode. This includes primary and alternate readers. If the reader has two-wire LED control, this feature is disabled. The reader starts beeping at pre-alarm time and continues to do so until the door is closed or the held open time is hit.

65.1.5 Open Supervised Device Protocol

Open Supervised Device Protocol (OSDP) uses bi-directional communications between readers and the reader interface, providing constant monitoring of reader health, improved control of reader operation and configuration in real-time, and additional communications capabilities over a single connection, including biometric template download and LCD reader display control.

Wiring for OSDP readers

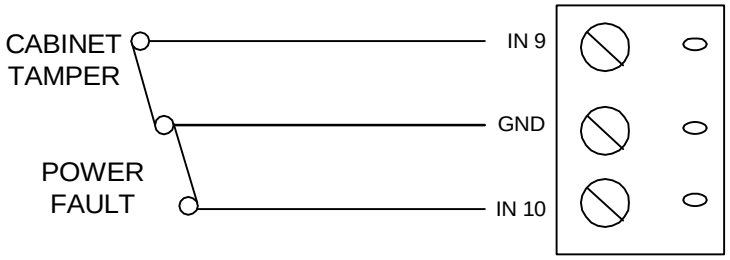


65.1.6 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

The Output Control Module features two unsupervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the BA (power fault) and CT (cabinet tamper) contact terminals located on the Output Control Module.

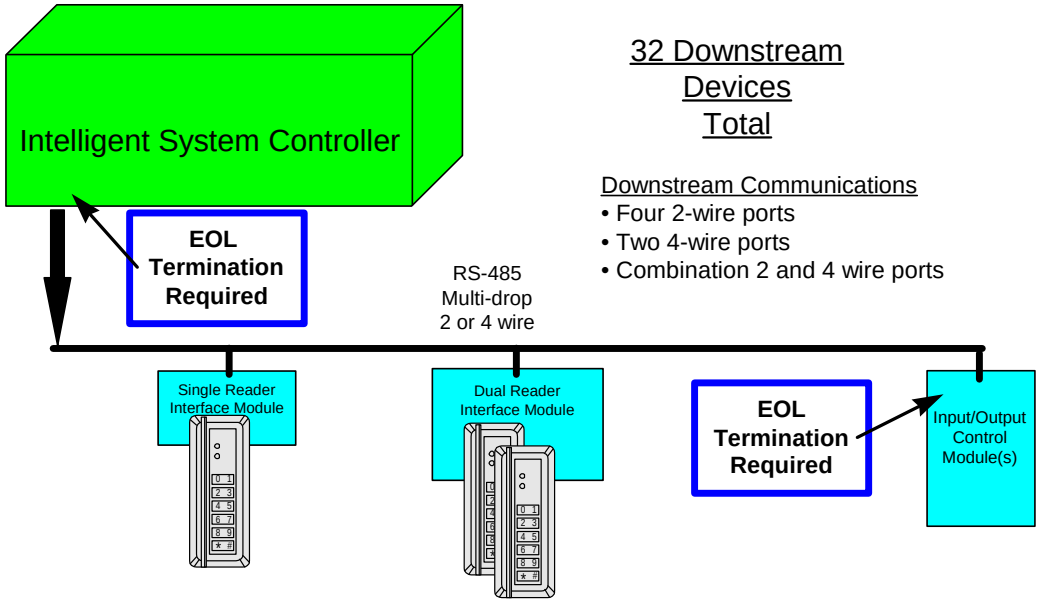
The BA and CT inputs are simple N/C (normally closed) contact closure monitors.

Wire the BA and CT inputs using twisted pair cable, 30 ohms maximum (No EOL resistors are required).



The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distances (4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances, End-Of-Line (EOL) termination is required.

RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has an on-board terminator. The installer should determine which device is at the end of the communication line.



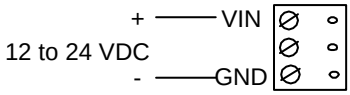
65.1.7 Power

The DRI accepts 12 to 24 VDC for power. Locate the power source as close to the DRI as possible.

Observe POLARITY on VIN!

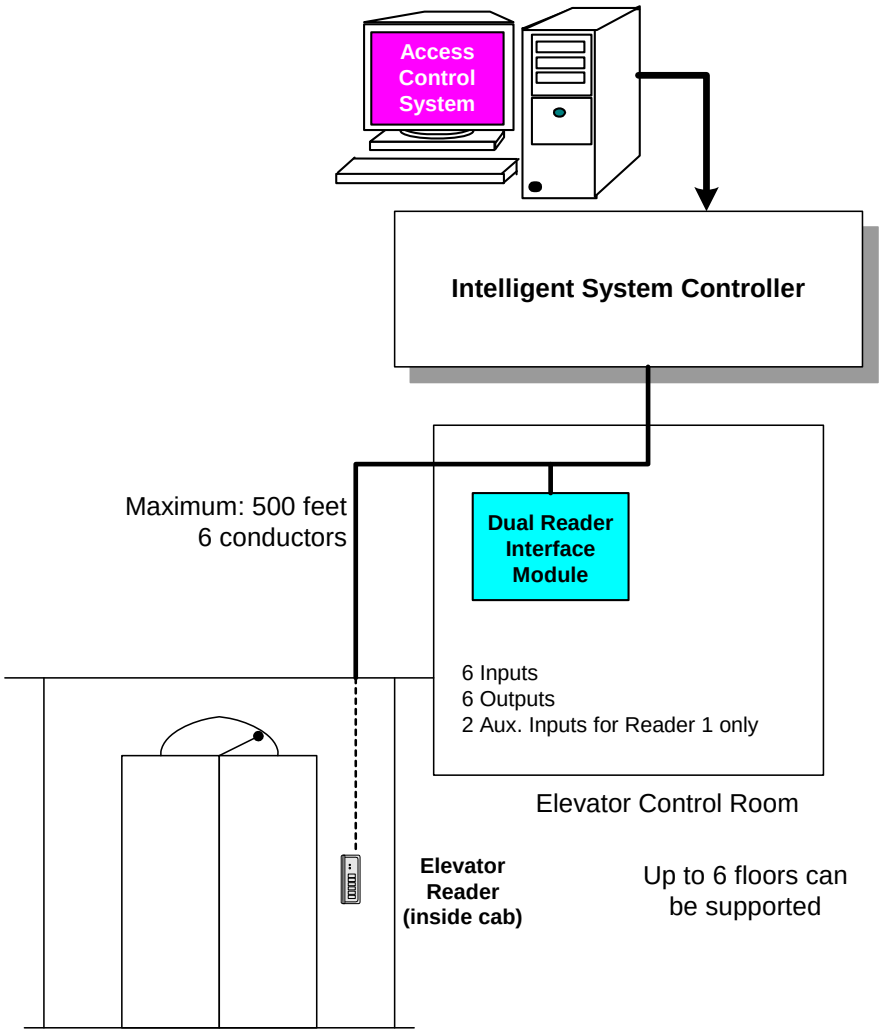
Wire the power input with 18 AWG (minimum) twisted pair cable.

Supply Power to the Interface



65.2 Elevator Control

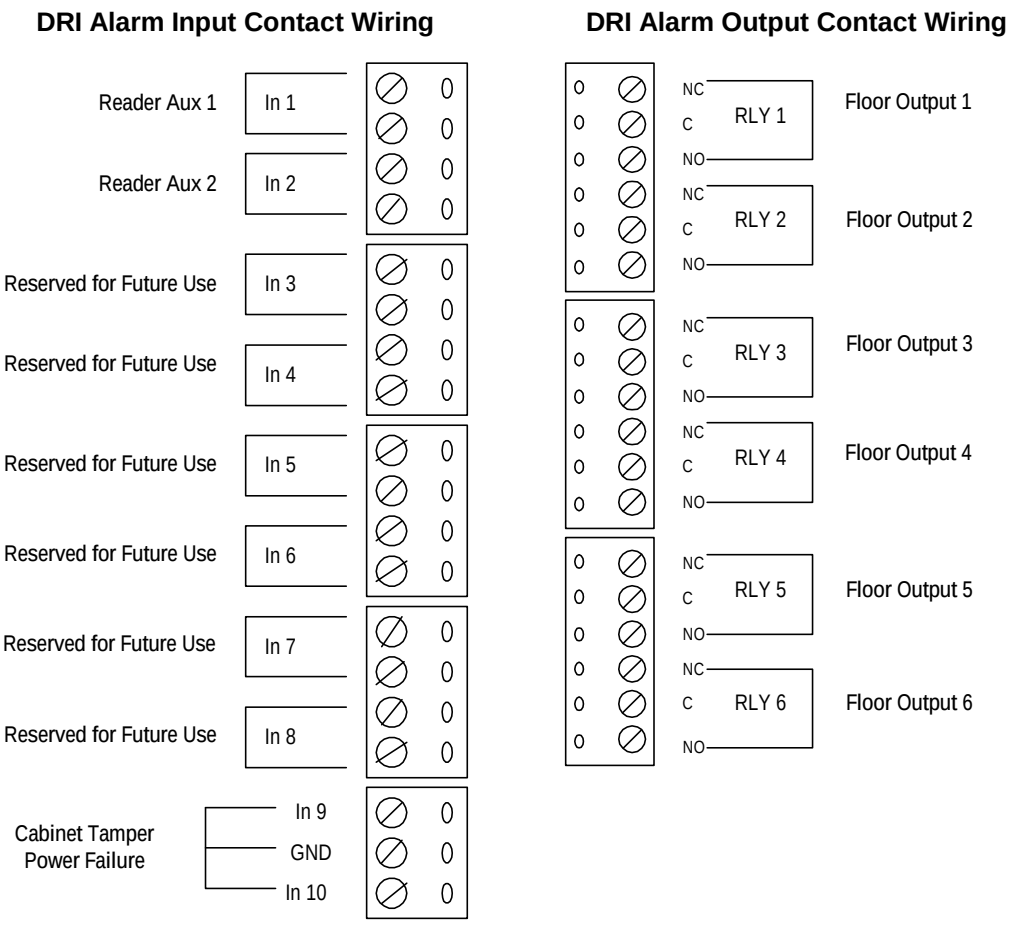
Currently, elevator control is supported for up to six floors on the Dual Reader Interface Module.



In order to use Elevator Control, your software must be configured for it. This can be done in System Administration on the Readers window.

On the Dual Reader Interface card, Reader 2 is not used. Only Reader 1 is used. The six aux outputs are used to control the six corresponding floor buttons.

Contact Wiring for Elevator Control

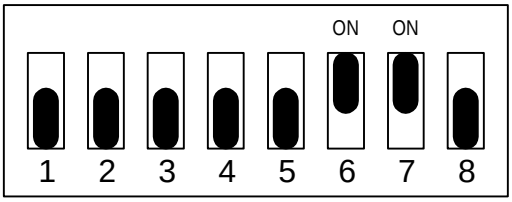


66 Configuration

The Dual Reader Interface Module board contains 8 DIP switches and 3 jumpers that must be configured for your system.

66.1 Setting DIP Switches

DIP Switches (shown in factory default position: Address 00; 38400 bps)



The following chart describes the use of each DIP switch.

DIP SWITCH(ES)	USED TO CONFIGURE:
1, 2, 3, 4, 5	Device communication address (0 - 31)
6, 7	Communication baud rate
8	Downstream encryption (available with OnGuard 2010 or later)

66.1.1 Device Address

To configure the device communication address, set DIP switches 1, 2, 3, 4, and 5 according to the following table.

ADDRESS	DIP SWITCH				
	1:	2:	3:	4:	5:
0	off	off	off	off	off
1	ON	off	off	off	off
2	off	ON	off	off	off
3	ON	ON	off	off	off
4	off	off	ON	off	off
5	ON	off	ON	off	off
6	off	ON	ON	off	off
7	ON	ON	ON	off	off
8	off	off	off	ON	off

ADDRESS	DIP SWITCH				
	1:	2:	3:	4:	5:
9	ON	off	off	ON	off
10	off	ON	off	ON	off
11	ON	ON	off	ON	off
12	off	off	ON	ON	off
13	ON	off	ON	ON	off
14	off	ON	ON	ON	off
15	ON	ON	ON	ON	off
16	off	off	off	off	ON
17	ON	off	off	off	ON
18	off	ON	off	off	ON
19	ON	ON	off	off	ON
20	off	off	ON	off	ON
21	ON	off	ON	off	ON
22	off	ON	ON	off	ON
23	ON	ON	ON	off	ON
24	off	off	off	ON	ON
25	ON	off	off	ON	ON
26	off	ON	off	ON	ON
27	ON	ON	off	ON	ON
28	off	off	ON	ON	ON
29	ON	off	ON	ON	ON
30	off	ON	ON	ON	ON
31	ON	ON	ON	ON	ON

66.1.2 Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table.

BAUD RATE:	DIP SWITCH	
	6:	7:
38400 bps	ON	ON
19200 bps	off	ON
9600 bps	ON	off
115,200 bps	off	off

Currently, OnGuard only supports a baud rate of 38400 bps, so be sure to set both DIP switches 6 and 7 to the ON position.

66.1.3 Communication Password Status

DIP switch 8 controls the utilization of encryption.

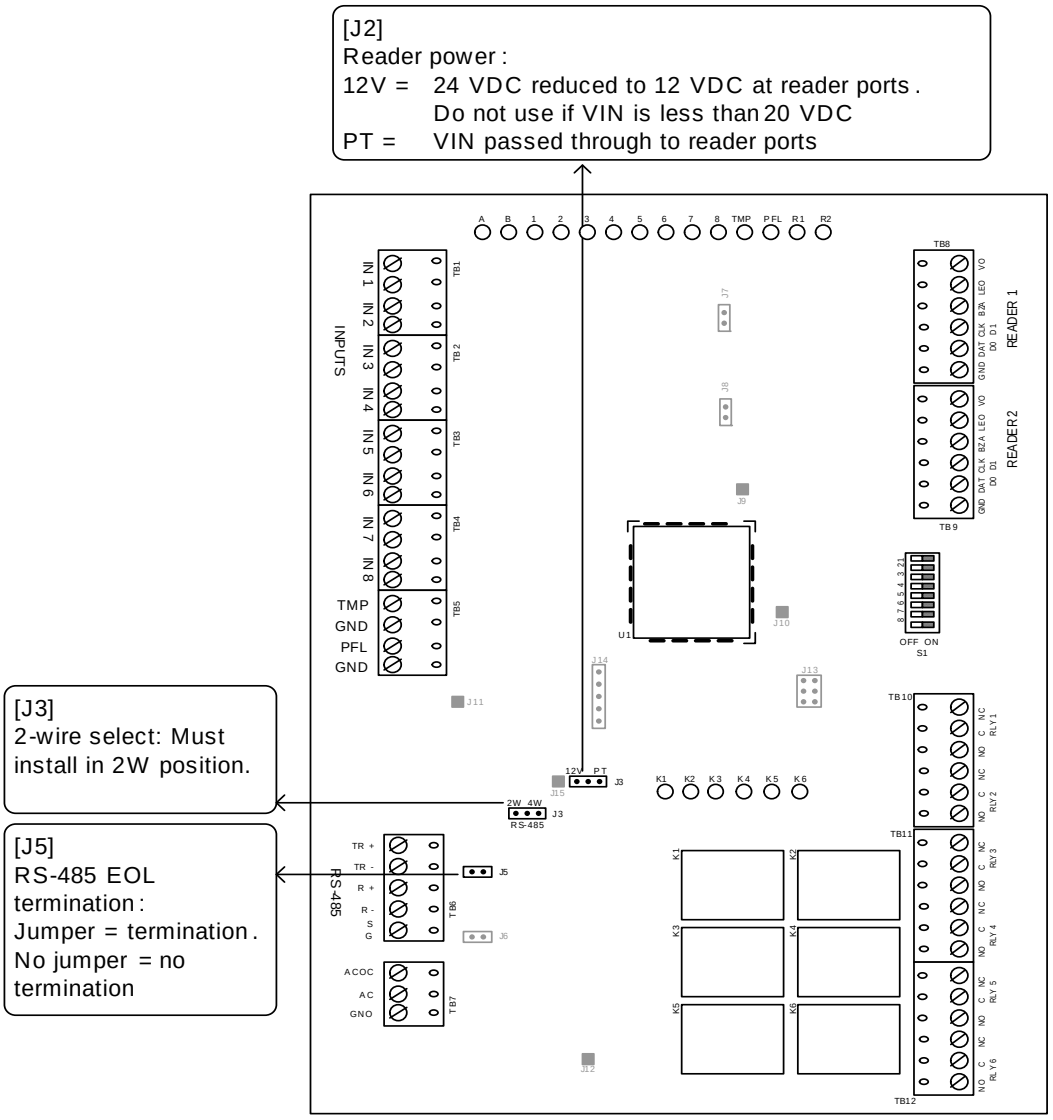
PASSWORD STATUS	DIP SWITCH 8: (OnGuard 2009 or later)	DIP SWITCH 8: (prior to OnGuard 2009)
Encryption is optional	off	Normal operation
Encryption is required	ON	Not allowed

When DIP switch 8 is ON, communication will not be allowed unless the access panel supports downstream encryption and is configured to enable encryption to this device.

When DIP switch 8 is off, the device will accept either encrypted or unencrypted communication. It must be off if the access panel does not support downstream encryption, or if downstream encryption is disabled for this device.

66.2 Installing Jumpers

The following diagram describes the use of each jumper on the board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.



67 Specifications

**The DRI is for use in low voltage, class 2 circuits only. These specifications are subject to change without notice.

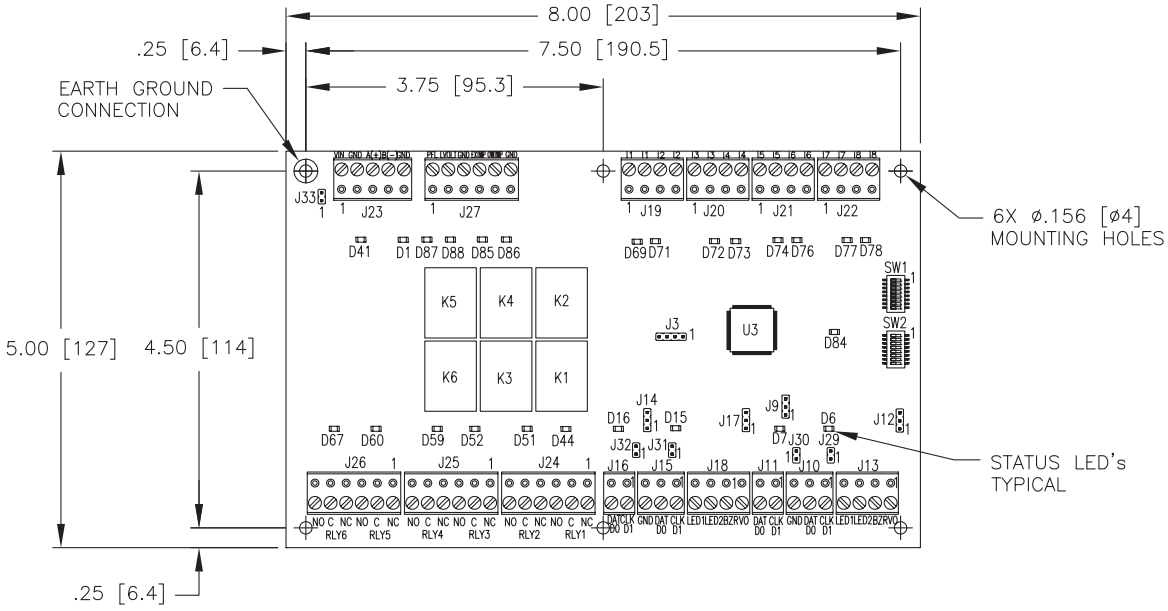
- Power: 12 to 24 VDC ± 10%, 550mA maximum (plus reader current)
  - 12 VDC @ 450mA(plus reader current) nominal
  - 24 VDC @ 270mA (plus reader current) nominal
- Outputs: Six outputs, Form-C, 5A @ 28 VDC resistive
- Inputs:
  - Eight (8) unsupervised/supervised, standard EOL, 1k/1k ohm, 1% 1/4 watt
  - Two (2) unsupervised, dedicated for cabinet tamper and UPS fault monitoring
- Reader interface:
  - Reader power (jumper selectable): 12 VDC + 10% regulated, 125mA maximum each reader or 12 to 24 VDC ±10% (input voltage passed through) 125mA maximum each reader
  - Reader LED output: TTL compatible, high > 3V, low < 0.5V, 5mA source/sink maximum
  - Reader buzzer output: Open collector, 5 VDC open circuit maximum, 10mA sink maximum
  - Reader data inputs: TTL compatible inputs or 2-wire RS-485
- Communication: RS-485 two-wire, 9600 to 115,200 bps
- Cable requirements:
  - Power: 18 AWG, 1 stranded twisted pair
  - RS-485: 24 AWG, 120 ohm impedance, stranded twisted pair with shield, 4000 feet (1219 m) maximum
  - Alarm inputs: 1stranded twisted pair per input, 30 ohms maximum
  - Outputs: As required for the load
  - Reader data (TTL): 6 conductors, 18 AWG stranded, 500 feet (152.4 m) maximum
  - Reader data (RS-485): 24 AWG, 120 ohm impedance, stranded twisted pair with shield, 4000 feet (1219 m) maximum
- Mechanical:
  - Dimension: 6 x 8 x 1 in. (152 x 203 x 25 mm)
  - Weight: 11 oz. (312 g) nominal
- Environmental:
  - Temperature: 0 to +70° C operating, -55 to +85° C storage
  - Humidity: 0 to 95% RHNC
- Certifications:
  - UL294 & UL1076 Listed
  - ULC Listed
  - FCC Part 15
  - C-Tick
  - CE marking
  - RoHS compliant
  - WEEE

LNL-1320-U DUAL DOOR CONTROLLER MODULE

68 Overview of the LNL-1320-U Board

The Dual Door Controller (DDC) provides a solution for interfacing to Wiegand Data1/Data0 and Magnetic Clock/Data readers or keypads (4/8 bit), and door hardware. It can accept data from a reader with clock/data, Wiegand signaling, or 2-wire RS-485 (OSDP), and provides a tri-stated LED control and buzzer control. Six form-C relay outputs may be used for strike control or alarm signaling. Eight (8) inputs are provided for monitoring the door contact, exit push button, and auxiliary inputs (supervised or unsupervised). Communication to the host controller and other modules is done via a 2-wire RS-485 interface. It requires 12 to 24 VDC for power.

DDC board (Dimensions are in inches [mm])



68.1 Package Contents

- LNL-1320-U board
- 1000 ohm resistors

69 Installation

To install the Dual Door Controller (DDC), perform the installation procedures described in the following sections, in the order in which they are presented.

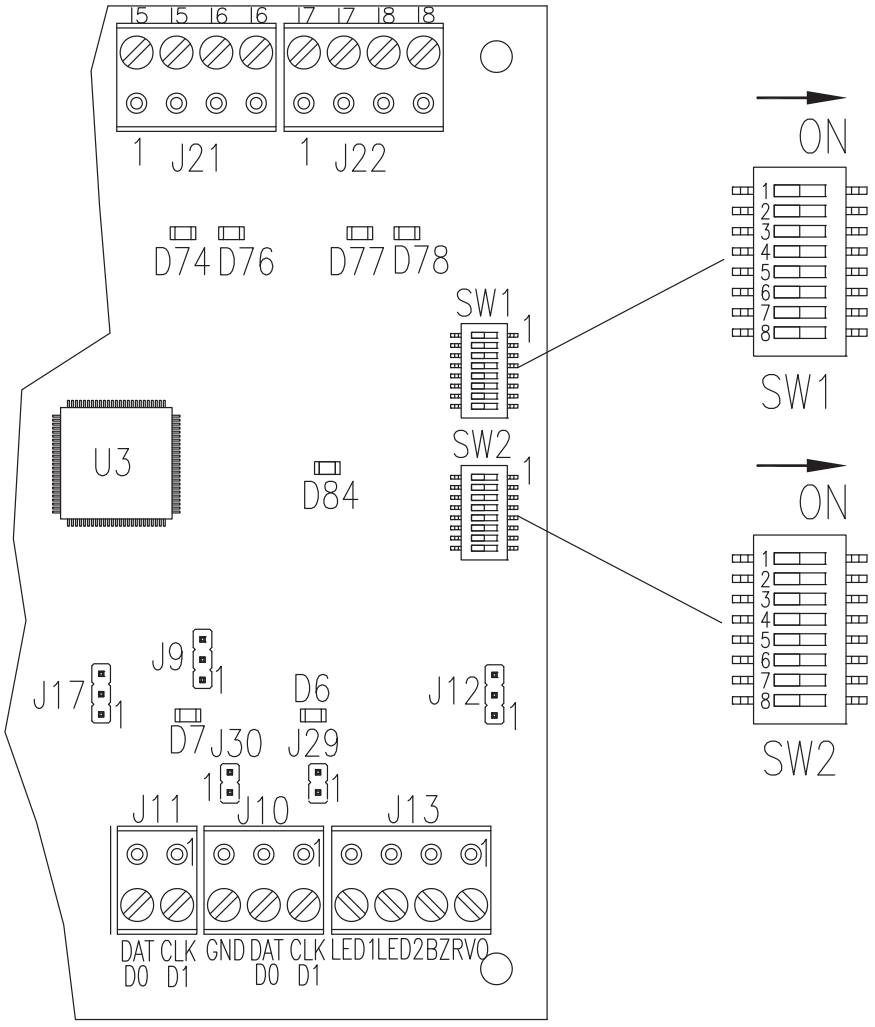
1. Set baud rate, address, and LED control switches.
2. Install jumpers.
3. Mount the board in the enclosure.
4. Wire the supervised alarm inputs.
5. Wire the upstream host communication.
6. Wire the relay outputs for door strike and AUX.
7. Wire the downstream interface for the keypad or card reader.
8. Wire the unsupervised alarm inputs for power fail and cabinet tamper.
9. Wire the power and communications inputs.
10. Validate proper operation on power up.

70 Configuration

The Dual Door Controller (DDC) Interface Module board contains two (2) 8-position DIP switches that are user-selectable to control addressing, baud rate, and other functions, and seven (7) jumpers used to configure your system.

70.1 Setting DIP Switches

DDC dip switches



70.1.1 Communication Baud Rate (SW1)

Configure the baud rate using SW1 switches 1-4. (Switch 5 is used for LED control. Switches 6-8 are not used.)

Baud rate	SW1 switch for host		SW1 switch for OSDP readers (Aux ports)	
	1:	2:	3:	4:
2400 bps	off	off	off	off
9600 bps	ON	off	ON	off
19200 bps	off	ON	off	ON
38400 bps	ON	ON	ON	ON

Led Mode

SW1 switch 5 is used for LED control. It is read at boot time. If you make a change to this setting, be sure to restart the module.

SW1 Switch 5	State
ON	LEDs behave as the Access (LNL) series module.
off	LED behavior is in Normal Mode

70.1.2 Device Address (SW2)

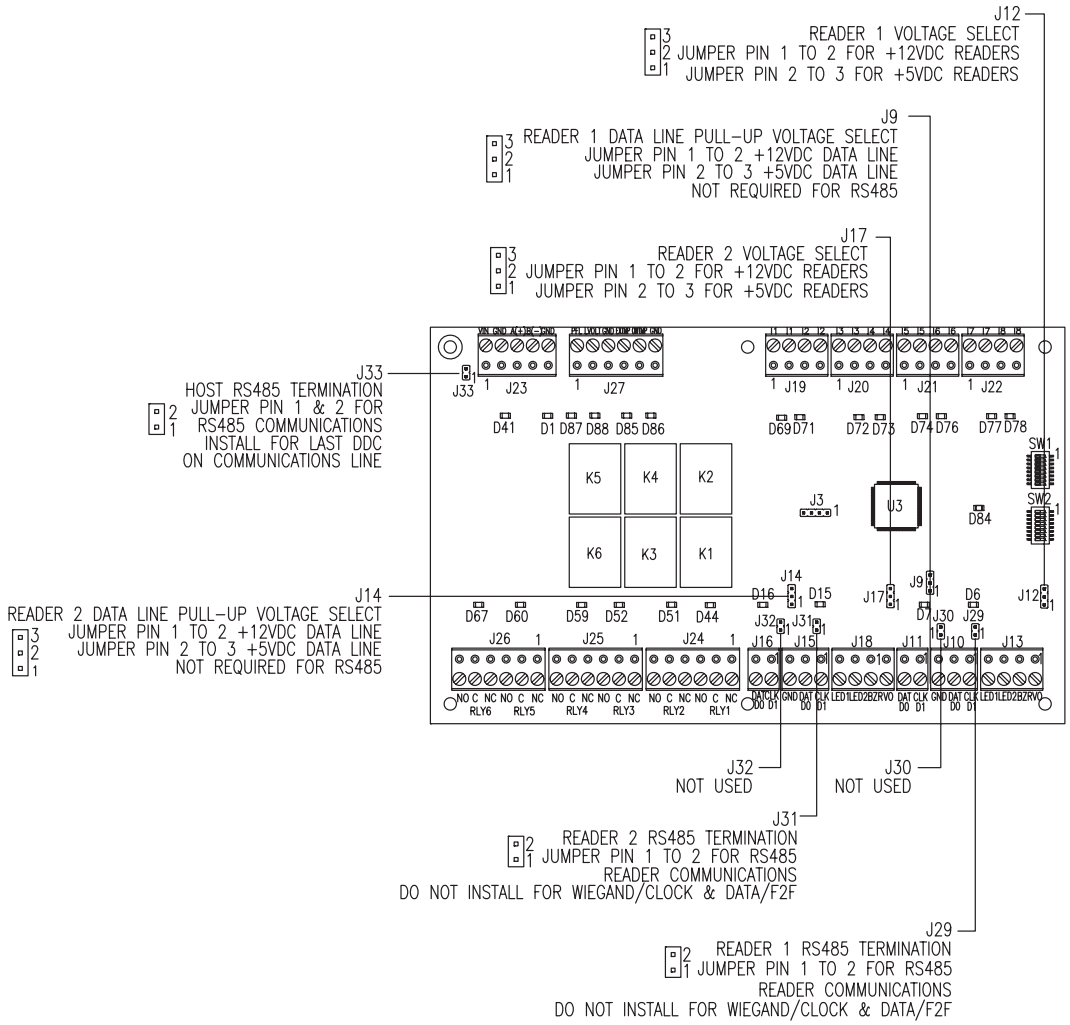
Configure the board address using SW2. (Switches 6-8 are not used.)

Address	SW2 switch				
	1:	2:	3:	4:	5:
0	off	off	off	off	off
1	ON	off	off	off	off
2	off	ON	off	off	off
3	ON	ON	off	off	off
4	off	off	ON	off	off
5	ON	off	ON	off	off
6	off	ON	ON	off	off
7	ON	ON	ON	off	off
8	off	off	off	ON	off
9	ON	off	off	ON	off
10	off	ON	off	ON	off

Address	SW2 switch				
	1:	2:	3:	4:	5:
11	ON	ON	off	ON	off
12	off	off	ON	ON	off
13	ON	off	ON	ON	off
14	off	ON	ON	ON	off
15	ON	ON	ON	ON	off
16	off	off	off	off	ON
17	ON	off	off	off	ON
18	off	ON	off	off	ON
19	ON	ON	off	off	ON
20	off	off	ON	off	ON
21	ON	off	ON	off	ON
22	off	ON	ON	off	ON
23	ON	ON	ON	off	ON
24	off	off	off	ON	ON
25	ON	off	off	ON	ON
26	off	ON	off	ON	ON
27	ON	ON	off	ON	ON
28	off	off	ON	ON	ON
29	ON	off	ON	ON	ON
30	off	ON	ON	ON	ON
31	ON	ON	ON	ON	ON

70.2 Installing Jumpers

Jumper configuration


J12
READER 1 VOLTAGE SELECT
JUMPER PIN 1 TO 2 FOR +12VDC READERS
JUMPER PIN 2 TO 3 FOR +5VDC READERS
J9
READER 1 DATA LINE PULL-UP VOLTAGE SELECT
JUMPER PIN 1 TO 2 +12VDC DATA LINE
JUMPER PIN 2 TO 3 +5VDC DATA LINE
NOT REQUIRED FOR RS485
J17
READER 2 VOLTAGE SELECT
JUMPER PIN 1 TO 2 FOR +12VDC READERS
JUMPER PIN 2 TO 3 FOR +5VDC READERS
J33
HOST RS485 TERMINATION
JUMPER PIN 1 & 2 FOR
RS485 COMMUNICATIONS
INSTALL FOR LAST DDC
ON COMMUNICATIONS LINE
J14
READER 2 DATA LINE PULL-UP VOLTAGE SELECT
JUMPER PIN 1 TO 2 +12VDC DATA LINE
JUMPER PIN 2 TO 3 +5VDC DATA LINE
NOT REQUIRED FOR RS485
J32
NOT USED
J30
NOT USED
J31
READER 2 RS485 TERMINATION
JUMPER PIN 1 TO 2 FOR RS485
READER COMMUNICATIONS
DO NOT INSTALL FOR WIEGAND/CLOCK & DATA/F2F
J29
READER 1 RS485 TERMINATION
JUMPER PIN 1 TO 2 FOR RS485
READER COMMUNICATIONS
DO NOT INSTALL FOR WIEGAND/CLOCK & DATA/F2F

Host Communications

- Jumper J33 pins 1 & 2 for RS-485 communications termination. Install jumper on the last DDC unit on the communications line for proper termination of the communications bus. For more information, refer to the DDC upstream communicationdiagram on page 364.

Reader 1 output voltage selection:

- Jumper J12 pins 1 & 2 for +12VDC readers
- Jumper J12 pins 2 & 3 for +5VDC readers

Reader 2 output voltage selection:

- Jumper J17 pins 1 & 2 for +12VDC readers
- Jumper J17 pins 2 & 3 for +5VDC readers

Reader 1 RS-485 termination:

- Jumper J29 pins 1 & 2 for RS-485 reader communications.

> **Important:** Do NOT install the jumper for Wiegand/Clock & Data/F2F Reader Communications.

Reader 2 RS-485 termination:

Jumper J31 pins 1 & 2 for RS-485 reader communications.

> **Important:** Do NOT install the jumper for Wiegand/Clock & Data/F2F Reader Communications.

Reader 1 data line pull-up voltage selection:

- Jumper J9 pins 1 & 2 for +12VDC Data Lines
- Jumper J9 pins 2 & 3 for +5VDC Data Lines

> **Note:** Not required for RS-485 communications.

Reader 2 data line pull-up voltage selection:

- Jumper J14 pins 1 & 2 for +12VDC Data Lines
- Jumper J14 pins 2 & 3 for +5VDC Data Lines

> **Note:** Not required for RS-485 communications.

Jumpers J30 & J32 not used.

70.3 Status LEDs

70.3.1 LED Table for Series 2 LNL-1320 Mode

When switch 5 is in the ON position, the LEDs behave like the series 2 LNL-1320.

Indication	LED	State
Power-up	ALL	Off
Initialization	D84	Flashing

Indication	LED	State
After initialization	D84	Offline: 1 second rate, 20% ON Online: 1 second rate, 80% ON
Communications	D1	ON

70.3.2 LED Table for Normal Mode

When SW1 switch 5 is in the off position, the LEDs operate in Normal Mode.

External tamper (cabinet tamper) must be open for Input LEDs to be on. When tamper is closed (cabinet door closed) Input LEDs will be off.

Indication	LED	State
RS-485 panel communication	D1	ON - Yellow
Reader 1 RS-485 communication	D6	ON - Yellow
Reader 2 RS-485 communication	D15	ON - Yellow
Power on	D41	ON - Green
Relay 1	D44	ON - Green
Relay 2	D51	ON - Green
Relay 3	D52	ON - Green
Relay 4	D59	ON - Green
Relay 5	D60	ON - Green
Relay 6	D67	ON - Green
Supervised input I1-I8	D69, D70-D74, D76-D78	Active: ON - Yellow Inactive: ON - Green Foreign: ON - Red Cut: Flashing - Green Short: Flashing - Red Ground: Flashing - Yellow
Unsupervised I1-I8	D69, D70-D74, D76-D78	Closed ON - Red, Open - Off

Indication	LED	State
CPU status	D84	Offline: 1 second rate, 20% ON Online: 1 second rate, 80% ON Flashing Green - Badge Read
External (cabinet) tamper	D85	Open ON - Red
Power fail	D87	ON - Red

CPU status LED D84 possible module error conditions for LED Normal and Series 2 modes:

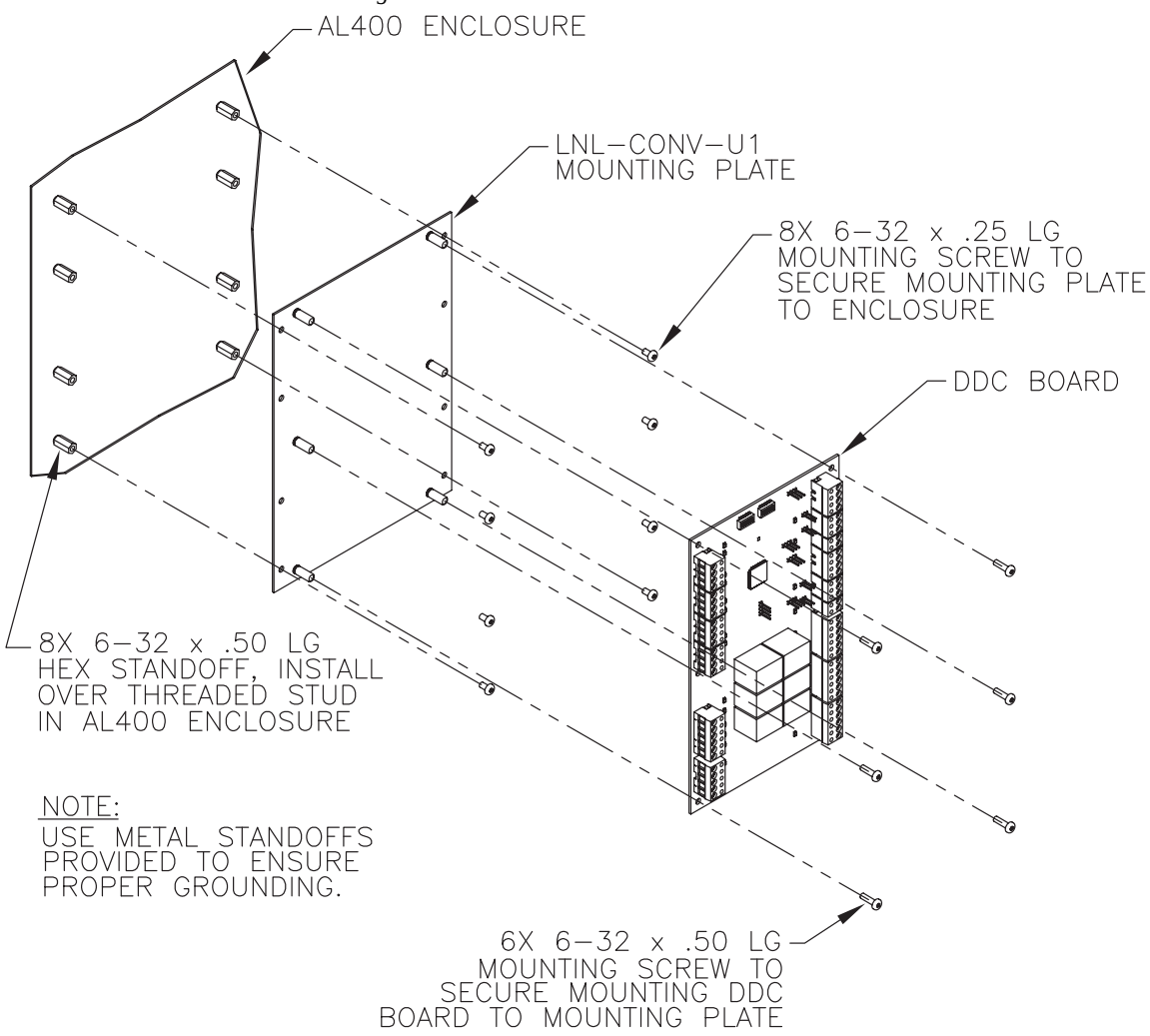
Error condition	Flashing pattern	Description
No valid application firmware	3 Red, 2 Green	The module is not operational. Firmware must be loaded using a console, e.g. HyperTerminal with Xmodem.
Boot loader waiting on firmware file	3 Red, 1 Green	Console boot loader is waiting on start of firmware file.
Boot loader loading firmware file	2 Red, 2 Green	Console boot loader is loading a firmware file.
Invalid EFL file	1 Red, 2 Green	The EFL specified to be loaded using the console loader is not a valid EFL file.
Invalid Xmodem packet	1 Red, 1 Green	The console loader received an invalid Xmodem packet and terminated the firmware download operation.
Invalid Application firmware for module CPU	3 Red, 0 Green	The module is not operational. Application firmware loaded on the module will not run properly. Requires new firmware be loaded using the console boot loader or the module must be returned for repair.
Invalid Boot firmware for module CPU	2 Red, 3 Green	The module is not operational. Boot loader firmware loaded on the module will not run properly. The module must be returned for repair.
Firmware update failed	1 Red, 3 Green	Firmware update operation was unsuccessful. Retry and if it fails continuously, load a different firmware file.
No valid primary firmware copy	3 Green, 2 Red	The firmware flash contains 2 copies of the application firmware. The primary copy is not valid so the backup copy will be loaded into the primary copy and executed.

Error condition	Flashing pattern	Description
No valid backup firmware copy	3 Green, 1 Red	The firmware flash contains 2 copies of the application firmware. The backup copy is not valid so the primary copy will be loaded into the backup copy.
No valid manufacturing parameters	3 Green, 0 Red	The manufacturing parameters which include the serial number, etc. are invalid. The module must be returned for repair.

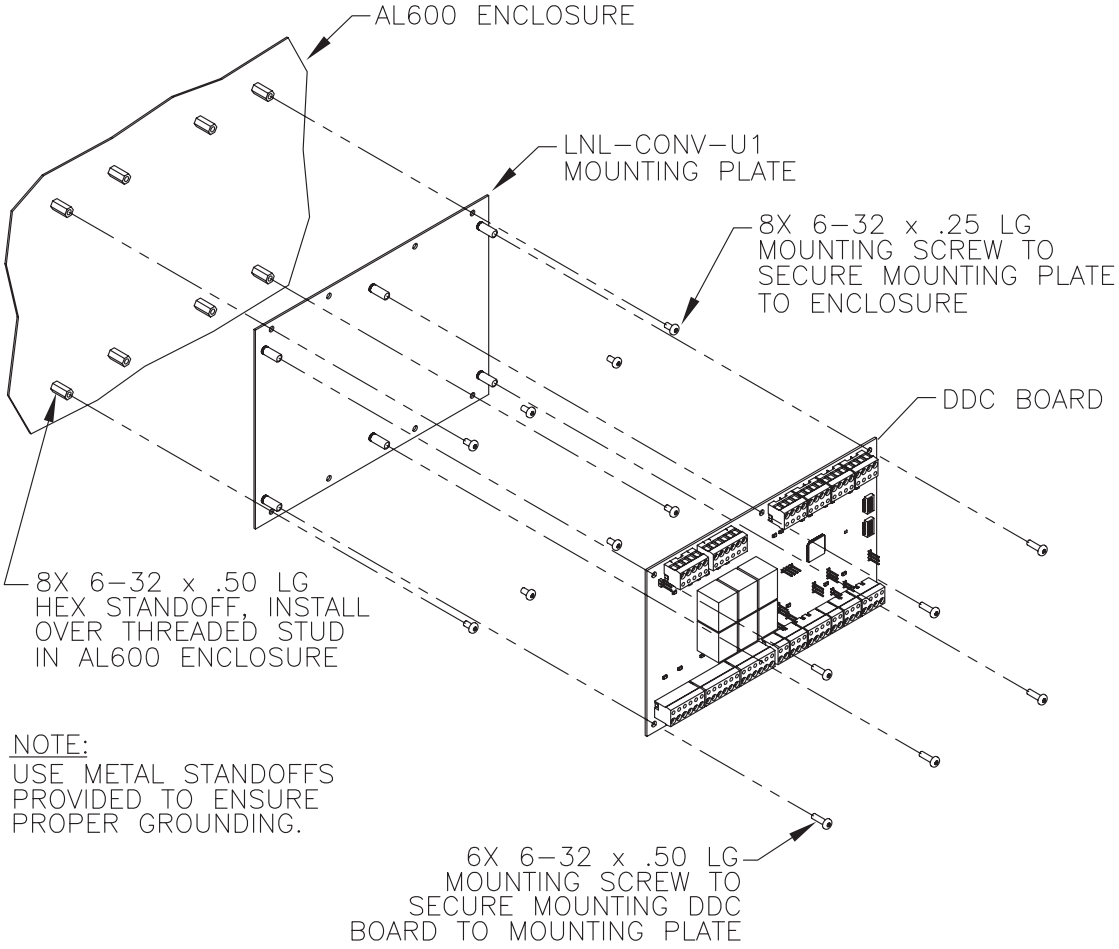
71 Mounting

The DDC can be mounted in the LNL-AL400ULX or LNL-AL600ULX-4CB6 and the LNL-CTX or LNL-CTX6 enclosure using the Universal Mounting Plate (UMP) LNL-CONV-U1.

Mounting the DDC in the LNL-AL400ULX and LNL-CTX



Mounting the DDC in the LNL-AL600ULX-4CB6 or LNL-CTX6



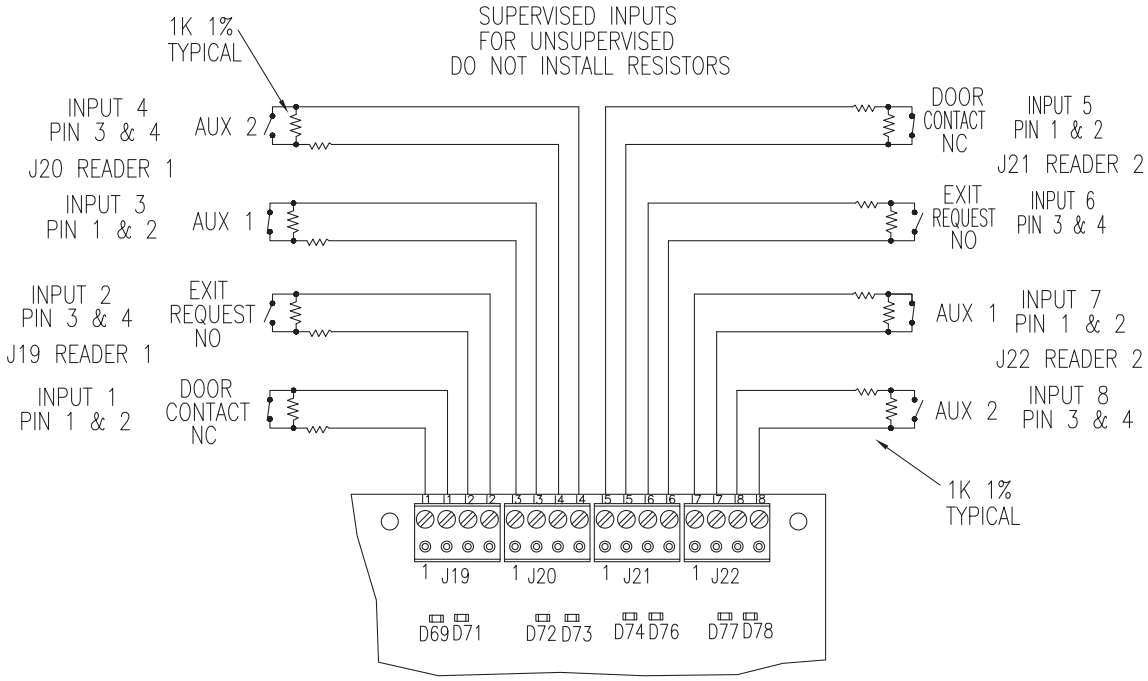
72 Wiring

Note: For UL installations, refer to section UL Listed Installations on page 369.

Wire inputs I1 through I8 (J19 - J22) using a twisted pair cable, 30 ohms maximum, 24 AWG minimum.

72.1 Supervised (Software Configurable) Alarm Inputs

DDC input wiring



Note: For termination resistor values, refer to the Input Resistor Table on page 364.

The eight (8) inputs that are available on the DDC are software configurable alarm inputs that can be used for alarm device monitoring. Each of these inputs can be configured, via the Access Control software, as either N/O (normally open) or N/C (normally closed) in combination with either supervised or unsupervised wiring. These alarm inputs are connected using Inputs 1 - 8. Inputs 1 and 6 are used for the door contacts, inputs 2 and 5 are used for request to exit switches, and inputs 3, 4, 7, and 8 are available for auxiliary inputs points.

Each input that is configured as a supervised alarm must be terminated with two (2) 1K (1000) ohm resistors (1% tolerance - 1/4 (0.25) watt. N/O and N/C alarms are terminated identically.)

Install the resistors (provided with the module) as close to input device as possible. For cable length limitations, refer to the Specifications section.

Input Resistor Table

	Alarm Zone Contact NC	Alarm Zone Contact NO
Normal	1K ± 25%	2K ± 25%
Alarm	2K ± 25%	1K ± 25%
Fault - Line Short	0 - 50	0 - 50
Fault - Line Open	15K - ∞	15K - ∞
Fault - Foreign Voltage	50 -750 1250 -1500 2500 -15K	50 - 750 1250 - 1500 2500 -15K

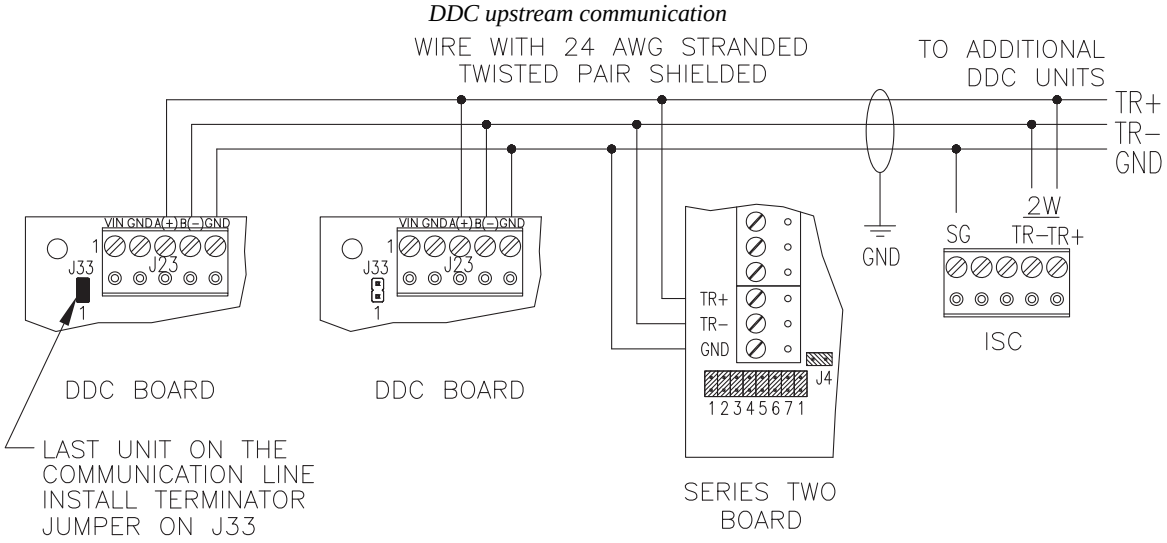
72.2 Upstream Communication

The DDC uses Port 1 to communicate to the Intelligent System Controller.

Port 1 is a 2-wire RS-485 interface, that requires the following type of RS-485 cable: 24 AWG (minimum) twisted pair (with shields). The main run RS-485 cable should be no longer than 4000 feet [1219 m], 100 ohms maximum (Belden 9841, West Penn, or equivalent). The drop cables (to downstream devices) should be kept as short as possible, no longer than 10 feet [3.048 m].

The RS-485 communication is asynchronous, half-duplex, using 1 start bit, 8 data bits, 1 stop bit.

DDC upstream communication



To enable RS-485 termination, install jumper on pin header J33 (on the last unit on the communications line).

Notes:

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distances (4000 feet [1219m]). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances, End-Of-Line (EOL) termination is required.

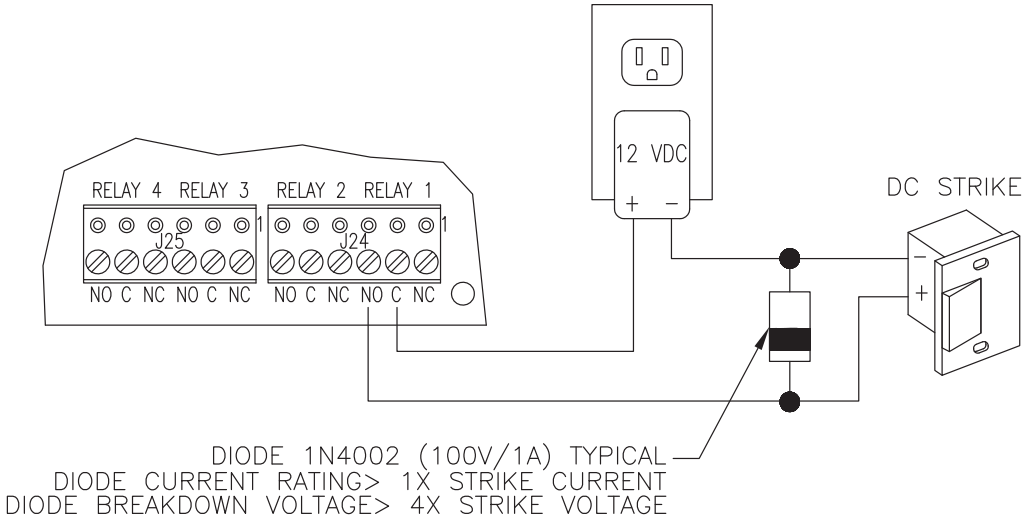
RS-485 must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has an on-board terminator. The installer should determine which device is at the end of the communication line.

72.3 Control Output Wiring

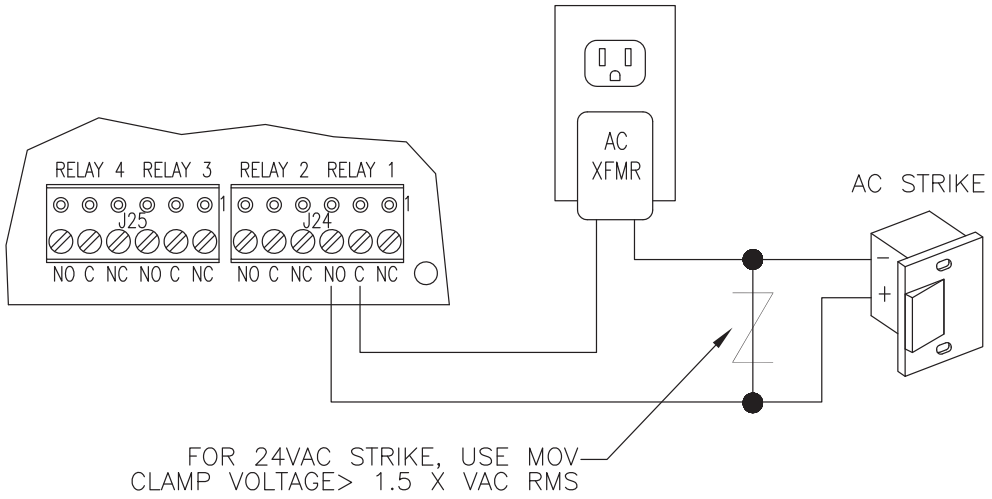
Contact protection circuit must be used. The following two (2) circuits are recommended. Locate the protection circuit as close to the load as possible (within 12 inches [30cm]), as the effectiveness of the circuit will decrease if it is located farther away.

72.3.1 Relay Outputs

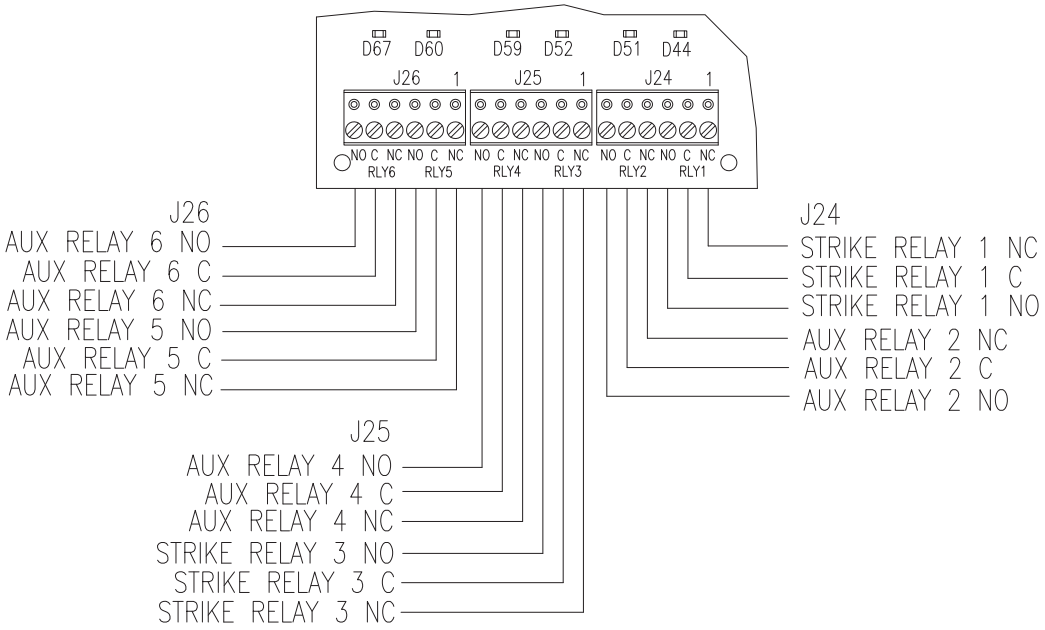
Relay contact (DC strike)


RELAY 4 RELAY 3 RELAY 2 RELAY 1
J25
J24
NO C NC NO C NC NO C NC NO C NC
12 VDC
+ −
DC STRIKE
− +
DIODE 1N4002 (100V/1A) TYPICAL
DIODE CURRENT RATING> 1X STRIKE CURRENT
DIODE BREAKDOWN VOLTAGE> 4X STRIKE VOLTAGE

Relay contact (AC strike)


RELAY 4 RELAY 3 RELAY 2 RELAY 1
J25
J24
NO C NC NO C NC NO C NC NO C NC
AC
XFMR
AC STRIKE
FOR 24VAC STRIKE, USE MOV
CLAMP VOLTAGE> 1.5 X VAC RMS

DDC AUX relay wiring


D67 D60 D59 D52 D51 D44
J26 J25 J24
NO C NC NO C NC NO C NC NO C NC NO C NC NO C NC
RLY6 RLY5 RLY4 RLY3 RLY2 RLY1
J26
AUX RELAY 6 NO
AUX RELAY 6 C
AUX RELAY 6 NC
AUX RELAY 5 NO
AUX RELAY 5 C
AUX RELAY 5 NC
J24
STRIKE RELAY 1 NC
STRIKE RELAY 1 C
STRIKE RELAY 1 NO
AUX RELAY 2 NC
AUX RELAY 2 C
AUX RELAY 2 NO
J25
AUX RELAY 4 NO
AUX RELAY 4 C
AUX RELAY 4 NC
STRIKE RELAY 3 NO
STRIKE RELAY 3 C
STRIKE RELAY 3 NC

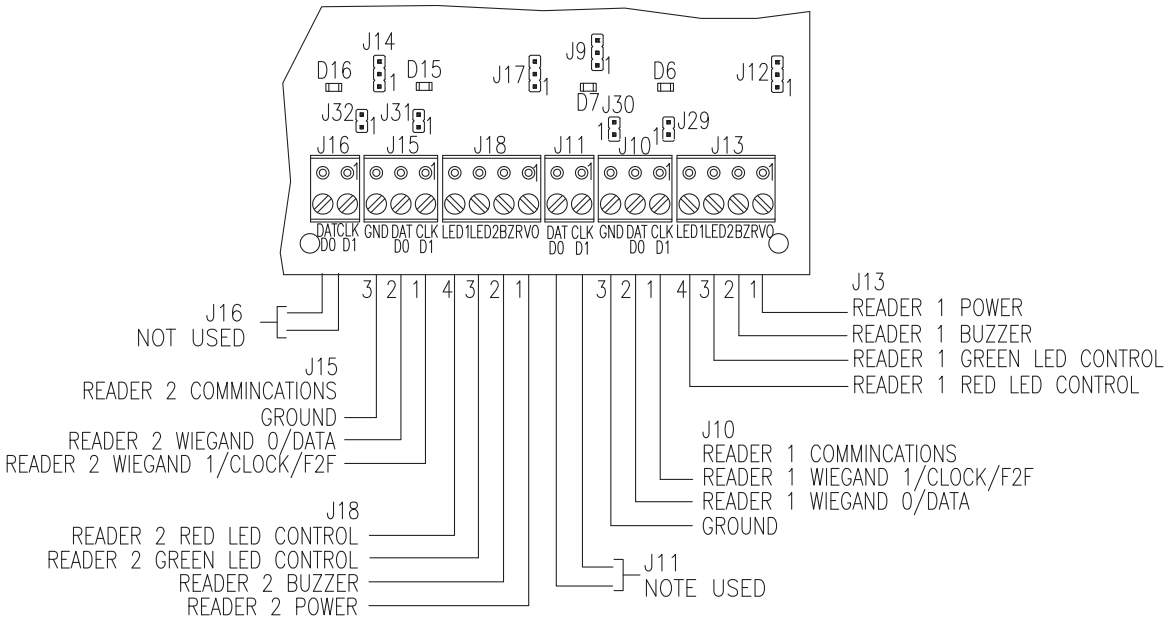
72.4 Downstream Reader Communication

The DDC can communicate to two (2) card readers. The interface is six-wire that includes buzzer and LED control. The LED and buzzer are both open collector type switching (sinking) 10mA maximum.

Wire using 18 AWG wire minimum and maximum length of 500 feet [152.4 m].

Reader power: Voltage 12 VDC +/-10% (optional 5 VDC +/-5% jumper selectable, current 400 mA maximum to 50°C, derate to 300 mA for 70°C)

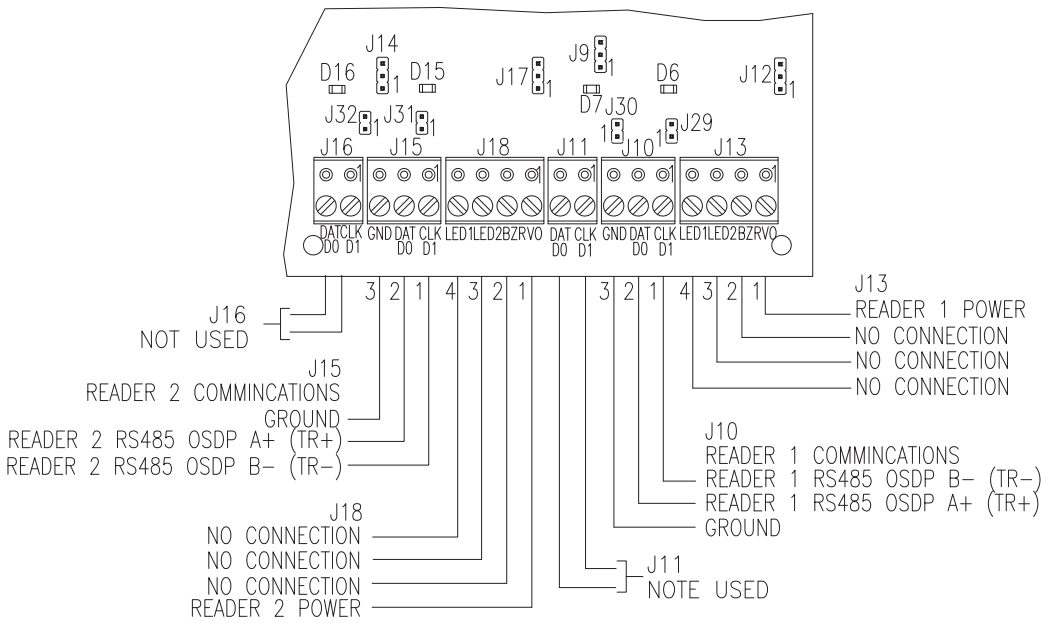
DDC reader wiring



72.5 Open Supervised Device Protocol

Open Supervised Device Protocol (OSDP) uses bi-directional communications between readers and the reader interface, providing constant monitoring of reader health, improved control of reader operation and configuration in real-time, and additional communications capabilities over a single connection, including LCD reader display control.

Wiring for OSDP readers

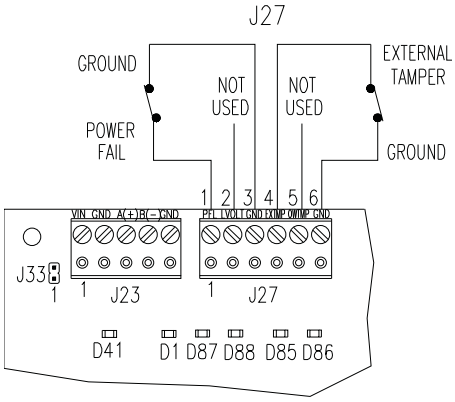


72.6 Unsupervised Alarm Inputs: Power Fail and External (Cabinet) Tamper

The Dual Door Controller (DDC) features two (2) unsupervised alarm inputs that can be used for power fault and external (cabinet) tamper monitoring. These inputs are connected using the PFL (power fail) and EXTMP (external cabinet tamper) contact terminals located on the Dual Door Controller.

The PFL and EXTMP inputs are simple N/C (normally closed) contact closure monitors.

Wire the PFL and EXTMP inputs using twisted pair cable, 30 ohms maximum (No EOL resistors are required).



Note: Input status LEDs will be off when the tamper device is in the closed position or the jumper is installed.

External (cabinet) tamper: Configure by connecting a tamper device across pins 3 & 4 of J27 on the DDC. If not used, a jumper must be installed across pins 3 & 4 of J27.

Power fail: Configure by connecting pins 1 & 6 of J27 to power fail device. If not used, a jumper must be installed across pins 1 & 6 of J27.

72.7 Power and Communications

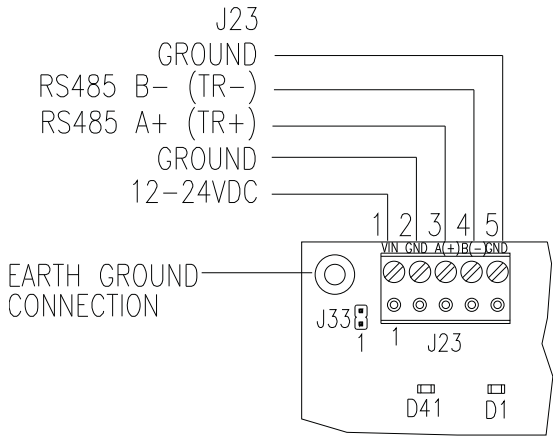
The Dual Door Controller requires a 12 to 24 VDC ± 10% power source for its input power.

Wire the Power In input with 18 AWG (minimum) twisted pair cable.

Power Source	Requirements	Current
DC power source	Isolated, non-switching, regulated DC power	1200mA for 12VDC 600mA for 24VDC

Note: Be sure to observe polarity.

Power source wiring



72.8 UL Listed Installations

For UL installations, the following must be observed:

- All field wiring terminals are suitable for single wire only.
- Use 22 AWG minimum for wiring of RS-485, Inputs I1-I8, and reader data.
- Input I2 “Do not supervise for UL” and therefore cannot be used for UL installations.
- RS-485, clock & data reader communications “Not Evaluated by UL” and therefore cannot be used in UL installations.
- RS-485 4-wire is “Not Evaluated by UL” and therefore cannot be used in UL installations.
- The use of AC Strikes is “Not Evaluated by UL” and therefore cannot be used in UL installations.
- Reader power for UL installations: 300 mA maximum for an operating temperature range of -10 to +49°C (14 to 120°F).
- Environmental for UL installations:
  - Temperature:-10 to +49°C (14 to 120°F) operating
  - Humidity: 85+/-5% at 30+/-2°C (86°F)

73 Specifications

Note: For UL installations, refer to section UL Listed Installations on page 369.

The LNL-1320 is for connection to low voltage, class 2 power-limited circuits only. These specifications are subject to change without notice.

- Primary power: 12 to 24 VDC + 10%
  - 12 VDC @ 1200 mA (includes reader current) nominal
  - 24 VDC @ 600 mA (includes reader current) nominal
  - 49.1 BTU/hour
- Outputs: Form-C contacts, Relays 1-6 (K1-K6), 5 A @ 30 VDC
- Inputs:
  - Eight (8) supervised, End of Line resistors, 1k/1k ohm, 1% 1/4 watt standard
  - One (1) unsupervised, dedicated external (cabinet) tamper
  - One (1) unsupervised, AC power fail
- Reader interface:
  - Reader power (per reader): voltage 12 VDC +/-10% (optional 5 VDC +/-5% jumper selectable, current 400 mA maximum to 50°C, derate to 300 mA for 70°C)
  - Reader LED output: open collector type switching (sinking) 10 mA each
  - Reader buzzer output: open collector type switching (sinking) 10 mA each
  - Reader data inputs: 2-wire RS-485, Wiegand Data1/Data0, Clock and Data
- Communication: RS-485, 2-wire, 2400 to 38400 bps
- Cable requirements:
  - Power: 18 AWG, 1 stranded twisted pair
  - RS-485: 24 AWG, 120 ohm impedance, stranded twisted pair with shield, 4000 feet [1219m] maximum
  - Alarm inputs: 1 stranded twisted pair per input, 30 ohms maximum
  - Outputs: As required for the load
  - Reader data (Wiegand, Clock and Data): 6 conductors, 18 AWG stranded, 500 feet [152.4 m] maximum
  - Reader data (RS-485): 24 AWG, 120 ohm impedance, stranded twisted pair with shield, 4000 feet [1219m] maximum
- Mechanical:
  - Dimension: 5 x 8 x 1.25 in. (127 x 203 x 32 mm)
  - Weight: 7.3 oz. (207 g) nominal
- Environmental:
  - Temperature: -10 to +70°C (14 to 158°F) operating, -40 to +85°C (-40 to 185°F) storage
  - Humidity: 10% at 93°C (199°F) non-condensing operating, 10 to 95% at 85°C (185°F) non-condensing storage
- Certifications:
  - FCC Part 15
  - ETL294, s319
  - UL294, 1076
  - C-Tick N22193
  - CE marking

- RoHS
- Environmental class: Indoor dry
- WEEE

LNL-8000 STAR MULTIPLEXER

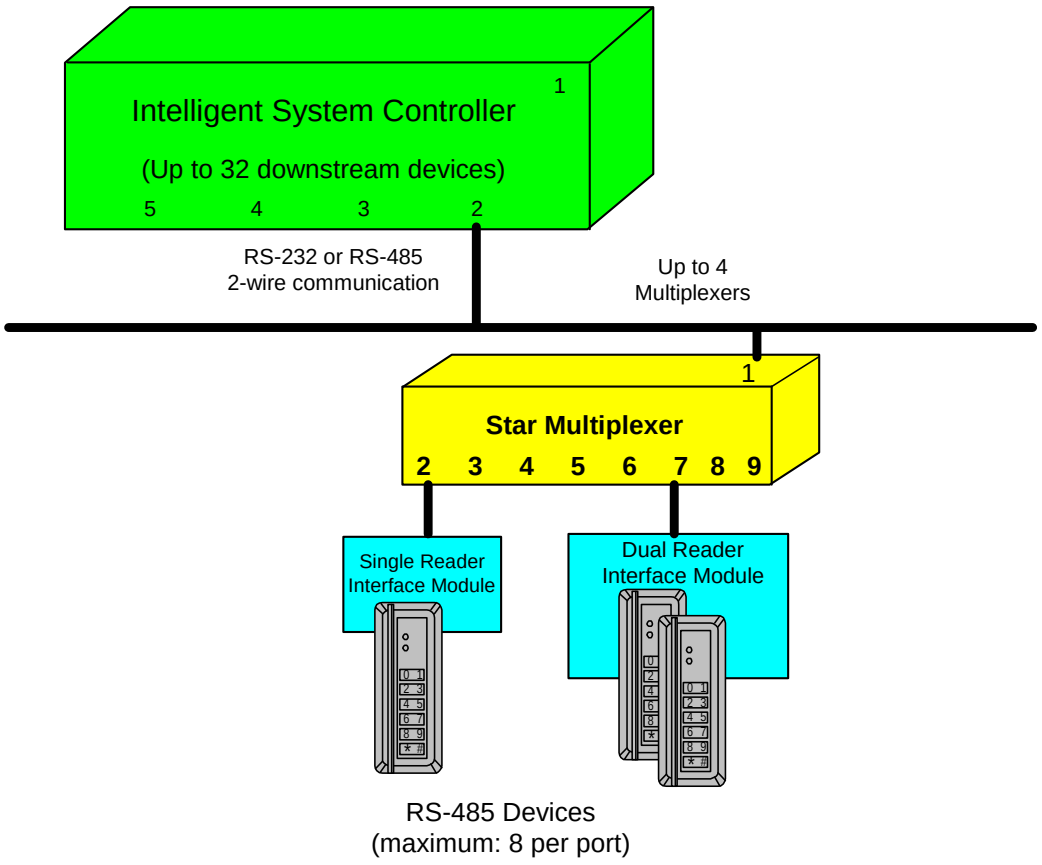
74 Overview of the LNL-8000 Board

The Star Multiplexer was designed to implement star topology on a single downstream port (ports 2 through 5) of the Intelligent System Controller, to eight RS-485 (2-wire) ports or four RS-485 (4-wire) channels. The Star Multiplexer requires 12 VDC for power. It allows conversion of communication protocol, and provides connection with alternate communication devices to extend effective distance.

74.1 Interfaces

The master or host interface can be either RS-232 or RS-485 (2-wire) communication. The Star Multiplexer interfaces upstream with the Intelligent System Controller, and downstream with one or many RS-485 products (Input Control Module, Output Control Module, Single Reader Interface Module, Dual Reader Interface Module) on each downstream port (ports 2-9). A maximum of eight (8) devices are allowed per port.

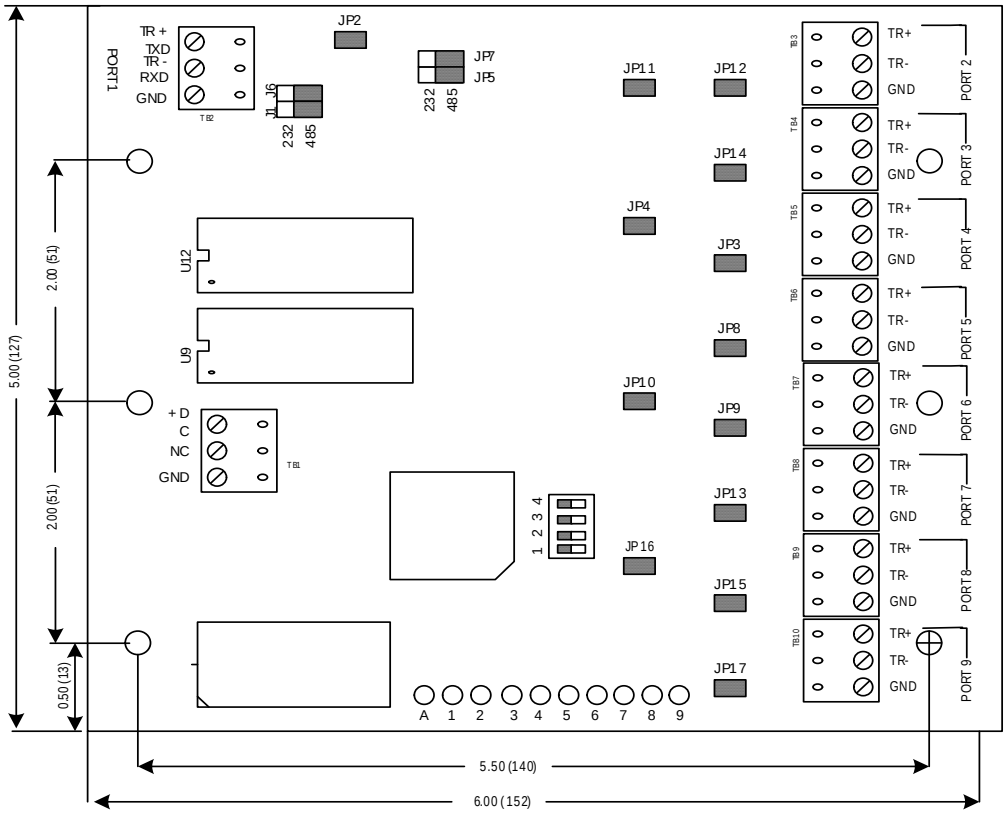
Communications Overview



74.2 The Star Multiplexer Board

The Star Multiplexer board contains the following components: one (1) power input, one (1) host communication RS-232/RS-485 input, eight (8) RS-485 (2-wire) Star Legs or four (4) RS-485 (4-wire), one (1) communication speed DIP Switch four-position selector and seventeen (17) jumpers.

Star Multiplexer Board



74.2.1 Status LEDs

There are ten (10) status LEDs on the Star Multiplexer.

LED	PURPOSE
A	This LED is the heartbeat of the circuit board. In its powered-up normal condition, the LED will blink rapidly. If there is no power, the LED will be off.
1	This LED indicates data coming from the upstream or host port. When data is being sent to the Star Multiplexer, this light will blink rapidly.
2-9	These LEDs indicate data coming from downstream devices. When data is being sent from a downstream device to a Star Multiplexer port, the corresponding LED will blink rapidly.

75 Installation

To install the Star Multiplexer, perform the installation procedures described in the following sections, in the order in which they are presented.

75.1 Wiring

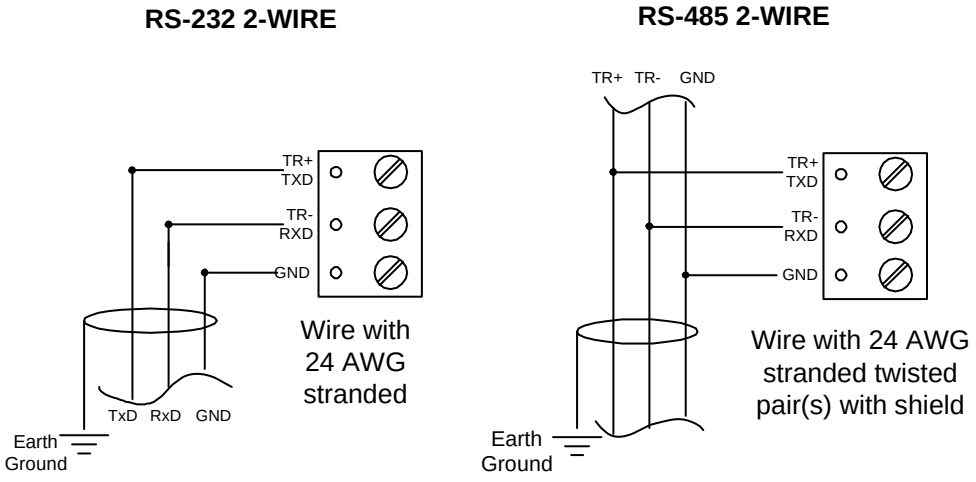
1. Wire the upstream host communication.
2. Wire the downstream device communication.
3. Wire the power input.

75.1.1 Upstream Controller Communication

The Star Multiplexer can communicate to the Intelligent System Controller by one of four downstream ports, either by RS-485 (2-wire) communications or RS-232 to RS-485 converters. The recommended configuration is with RS-485 (2-wire) communications.

Each port of the Intelligent System Controller (ports 2-5) can support up to four (4) Star Multiplexers within 1000 feet of the Intelligent System Controller. The Intelligent System Controller ports are not limited to only the Star Multiplexer. The controller is capable of other addressable devices (such as the Input Control Module, Output Control Module, Single Reader Interface Module, or Dual Reader Interface Module) on the same port as the Star Multiplexer. However, the same distance limitation applies.

Upstream Host Communication Wiring



The RS-232 communications interface is for short distance wiring or point to point communications. This interface is intended for a short distance communication because its high impedance is more susceptible to noise. Cable length is generally limited to 50 feet (15m). If required, this distance may be extended to a few hundred feet by using low capacitance shielded cables (the optimal cable is a Belden 9610 or equivalent wire) or line signal converters.

The main run RS-485 cable should be no longer than 4000 feet (1219 m), 120 ohms maximum (Belden 9842 for 4-wire or Belden 9841 for 2-wire, or plenum cabling Belden 88102, West Penn, or equivalent). The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

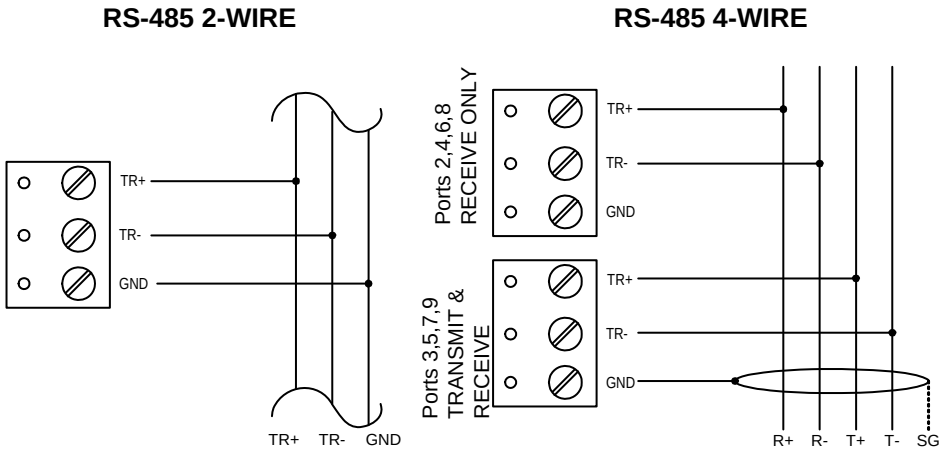
Note: If the Star Multiplexer is configured at the end of the RS-485 line, an RS-485 terminator is required.

75.1.2 Downstream Device Communication

The Star Multiplexer topology is capable of eight different downstream directions in RS-485 (2-wire) communications (using Belden 9841, West Penn, or equivalent) or four different downstream directions with RS-485 (4-wire) communications (using Belden 9842, West Penn, or equivalent).

Each Leg of the star, in either configuration, has a maximum wire distance of 4000 feet. Each leg supports up to eight (8) hardware RS-485 devices (Input Control Module, Output Control Module, Single Reader Interface Module, or Dual Reader Interface Module) in many configurations.

Downstream Device Communication Wiring



75.1.3 Power

The Star Multiplexer accepts a 12 VDC ± 15% power source for its power input. The power source should be located as close to the Star Multiplexer as possible.

Wire the power input with an 18 AWG (minimum) twisted pair cable.

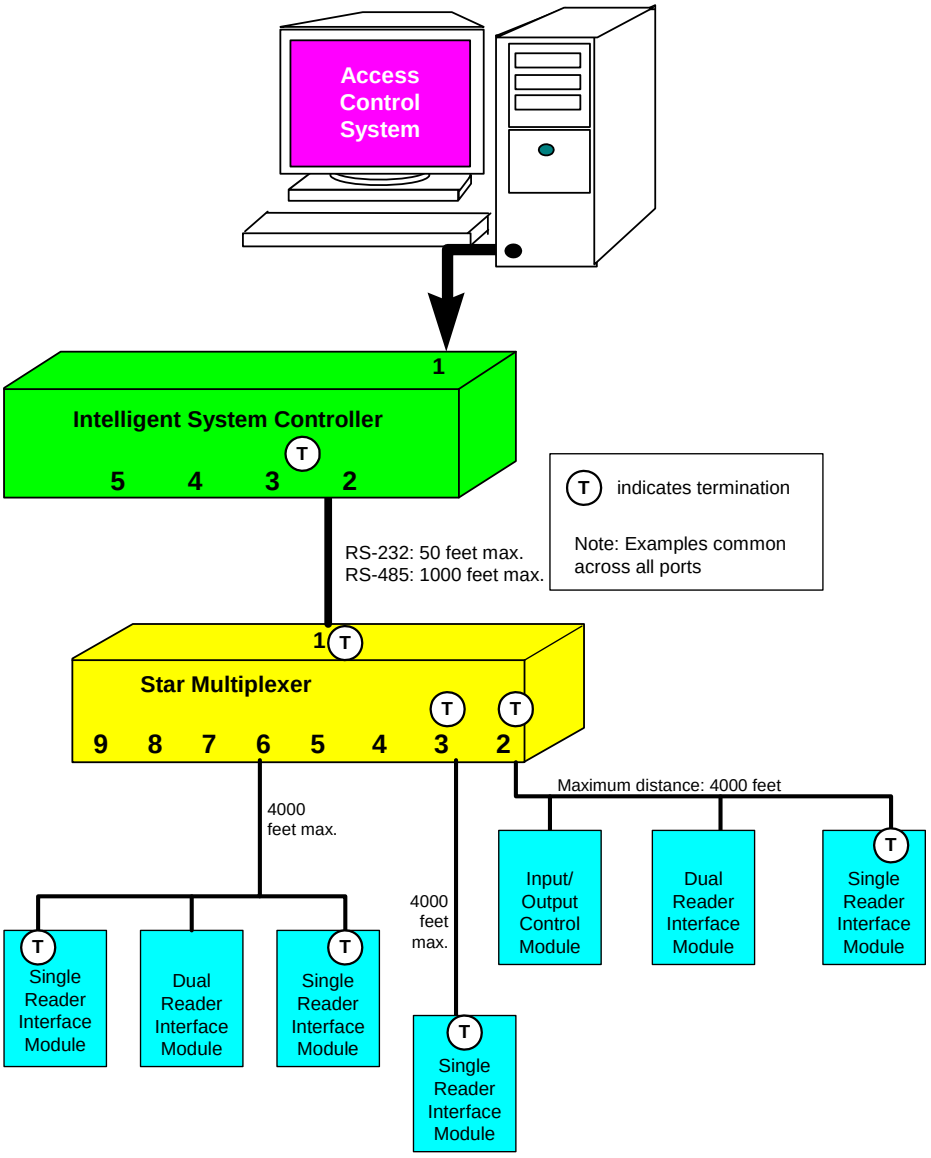
Power Source	Requirements	Current
DC power sources	Isolated, non-switching, regulated DC power	250 mA

Note: When using a 12 VDC power source, be sure to observe polarity.

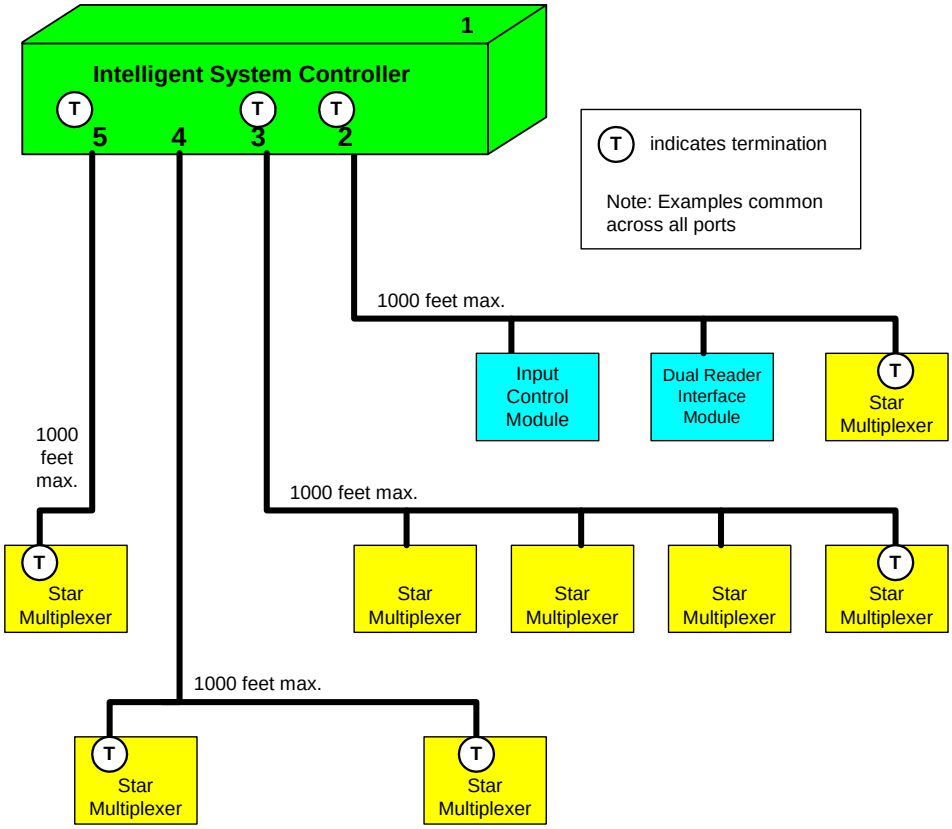
75.2 Wiring and Termination

The following diagrams depict possible combinations of devices and recommended termination for each. Note that these examples are common across all ports.

Wiring and Termination (from the ISC to downstream devices)



Wiring and Termination (from the ISC to the LNL-8000)

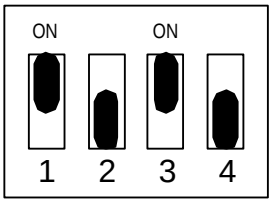


76 Configuration

76.1 Setting DIP Switches

The Star Multiplexers DIP switches are used to control the communication speed setting.

DIP Switches (shown in default positions: 38400 bps)



The communication speed is determined by the speed at which the Intelligent System Controller is communicating to the downstream devices. Use the following table to configure your selection:

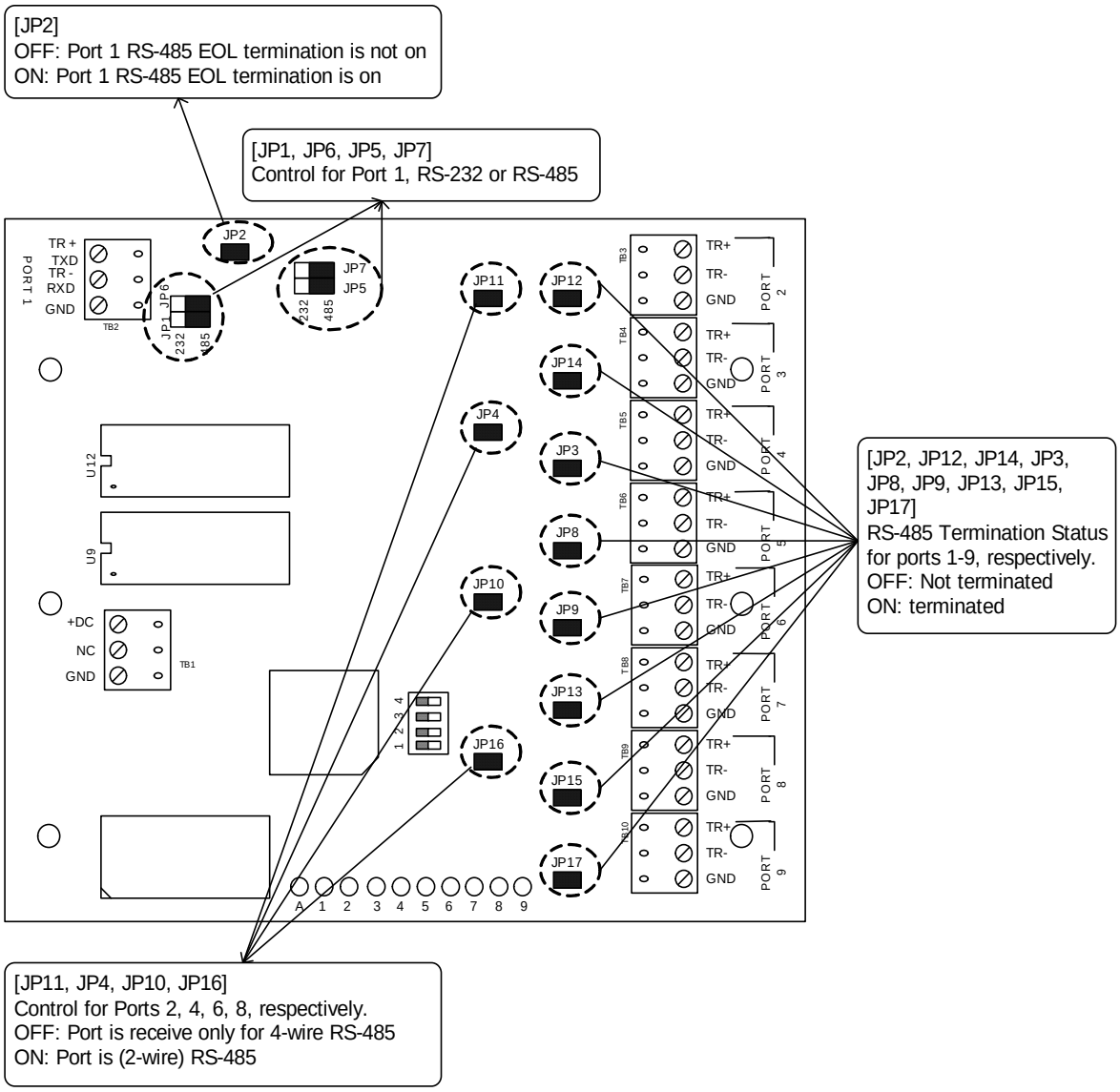
S1	S2	S3	S4	Speed
OFF	ON	OFF	OFF	2400 bps
ON	ON	OFF	OFF	4800 bps
OFF	OFF	ON	OFF	9600 bps
ON	OFF	ON	OFF	19200/38400 bps

Currently, OnGuard only supports 38400 bps. Set the communication speed DIP switches in the default position of 38400 bps.

When connecting the star multiplexer directly to a host computer for multi-drop configuration, the DIP switch settings should be set to all ON - this setting is 38400 BPS Fast.

76.2 Installing Jumpers

The following diagram describes the use of each jumper on the board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.



77 Specifications

** The Star Multiplexer is for use in low voltage, class 2 circuits only.

- Primary Power:
  - DC input: 12 VDC ± 15%. 250 mA
- Interfaces:
  - Port 1: RS-232/RS-485, selectable
  - Ports 3, 5, 7, 9: RS-485, Transmit/Receive
  - Ports 2, 4, 6, 8: RS-485, Transmit/Receive or Receive Only
- Wire Requirements:
  - Power: 1 stranded twisted pair, 18 AWG
  - RS-485: 24 AWG stranded twisted pair(s) with shield, 4000 feet (1200 m) maximum
  - RS-232: 24 AWG stranded, 50 feet (15 m) maximum
- Environmental:
  - Temperature: 0 to 70° C operating, -55 to +85° C storage
  - Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimension: 5 x 6 x 1 in. (127 x 152 x 25 mm)
  - Weight: 4 oz. (114 g) nominal
- Certifications:
  - UL294 & UL1076 Listed
  - ULC Listed
  - FCC Part 15
  - CE marking
  - RoHS compliant
  - WEEE

Note: These specifications are subject to change without notice.

LNL-2005W
MAGNETIC CARD
ACCESS READER

78 Overview

This installation guide is intended for use by technicians who will be installing and maintaining LNL-2005W Magnetic Card Access Readers.

OnGuard Magnetic Card Access Readers are durable, dependable, convenient and competitively priced. The Magnetic Card Access Readers are available in both 5 VDC and 12 VDC models. The reader's are in fully weatherized metal casing shells, which provide strength and durability. The readers are first treated with an anti-corrosion film and then coated with a tough abrasion resistant finish, available with a beige or black textured finish, which compliments any interior or external decor. The readers accept low and high coercivity magnetic stripe cards. Track 2 magnetic readers are standard with optional Track 1 or Track 3 readers available.

The reader communicates to the Intelligent System Controller (ISC) through one of two reader interface modules. The single or dual reader interface modules interpret the Wiegand communication (Data 1/Data 0 or Clock and Data) from the reader and sends the signal via RS-485 back to the ISC. The reader can be located up to 500 feet (152.4 m) away from the reader interface module.

79 Installation

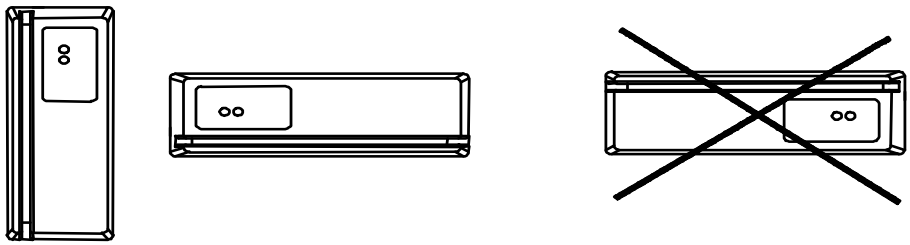
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

79.1 Wiring

The reader has an RJ-45 modular jack for easy field connection. A small piece of pre-terminated cable is supplied with each standard reader for field wiring. The pre-terminated cable has non-standard color. Refer to pin number if the pre-terminated cable is not used. Cable with wires of 24 AWG or larger, 6 conductor (Belden 9536 or equivalent) are recommended for field wiring.

79.2 Mounting the Reader

Find a suitable location to anchor the reader mounting bracket. The reader may be mounted vertically or horizontally. See recommended orientation. The mounting of the reader does not require a junction box. However, rigid conduit is required for outdoor application. A single gang junction box may used to provide transition to rigid conduit. If a single gang junction box is used, a wall plate (optional) may be used to cover the junction box. The reader is then secured to the mounting bracket using a screw. Refer to figures for reader dimensions and typical junction box usage.

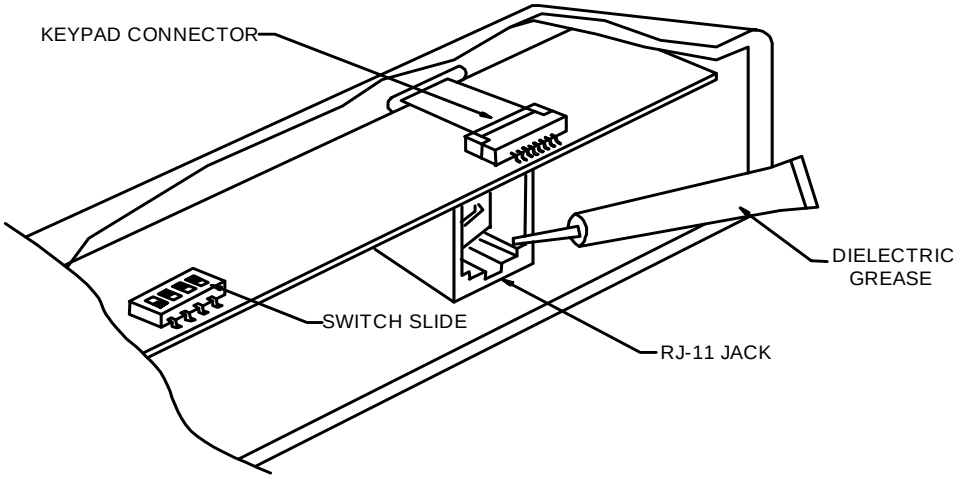


Recommended	Not Recommended

79.3 Weatherproofing the Reader

The reader is rated to operate over extended temperature. All readers are shipped weatherized, and the electronics are conformal-coated against moisture. A tube of dielectric grease is supplied for the installer to coat field connections. After field connection/configuration is made, the grease is to be applied on the DIP switch slides, keypad connection, the RS-485 termination, and the RJ-45 jack to seal off moisture.

Do not use sealant to seal reader case to wall. Doing so will trap water in the reader and may cause damage to the reader.



Be sure to clean the read head(s).

The leading cause of accelerated read head wear is contamination in the read head slot. To maximize the life of the read head, it is important to clean the reader periodically to remove any contamination. The frequency depends on the environment in which the reader is located. Indoor readers in controlled environments will need to be cleaned much less often than an outdoor reader exposed to airborne dirt and debris. Dirt and debris are also transferred from cardholder cards that have been contaminated with sticky substances. Read head cleaning cards are available to clean the readers.

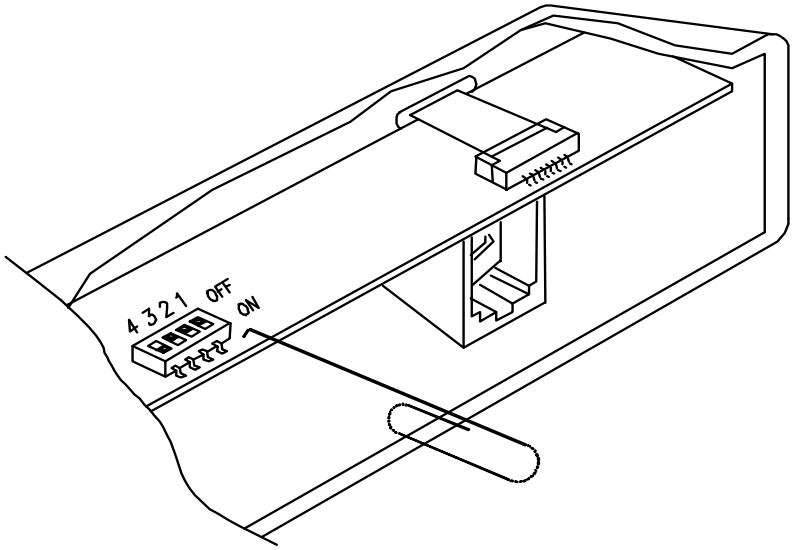
For heavy traffic areas, extended life read heads are also available from the factory at the time of order which will extend the read head life up to 1 million card swipes. For heavy traffic, outdoor readers should be cleaned at least once per month. A good indication as to how often a reader needs to be cleaned is when using a cleaning card, if the card has no visible signs of contamination, the reader could be serviced less often. Another indication is if the card reader, starts to give invalid card reads, the reader may need to be serviced more often. A read head that is starting to fail due to exceeding the maximum number could cause this or card reads on the read head (std. 600,000 or extended 1million).

Weather Shield Option – even though the Magnetic swipe card readers are fully weatherized, there are still times when the card reader may need more protection from the environment. If a reader has been installed at a remote parking lot or on a build with no overhang to prevent rain, ice or snow from building up in the reader throat, you may want to install the weather shield (LNL-WS10). This weather shield can be used with all LNL-2005W, 2010W, and 2020W readers.

80 Configuration

80.1 DIP Switch/Jumper Setting

All reader models are equipped with DIP switches for configuration/parameter setting. DIP switches are set by moving the slide to on/off position using a small tool (may be made from a paper clip). Remove the top mounting bracket to access the DIP switches.

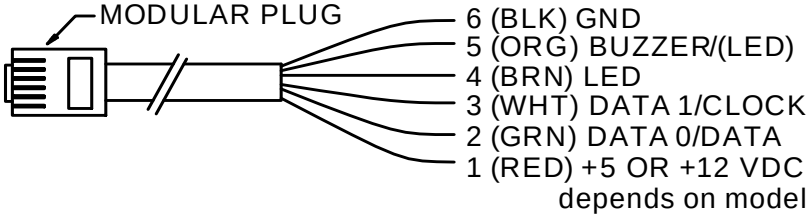


Set DIP switches 2, 3, and 4 to OFF. DIP switch 1 should be configured according to the output.

DIP SWITCH	SELECTION	
1		
OFF	DATA INTERFACE	clock/data (magnetic stripe) output
ON		data 1/data 0 (Wiegand) output

80.2 TTL Interface

The TTL interface has the standard 6-wire interface widely used in access control applications. In addition, an input to control the buzzer is provided. Cable with minimum of 24 AWG wires should be used.



80.3 Grounding the Reader

To avoid having ESD (electrostatic discharge) interfere with the operation of the reader, the reader casing shall be grounded. This can be accomplished be connecting the mounting bracket to earth ground locally (e.g. grounded conduit).

80.4 Reader Verification

The reader performs a self-test when power is first applied to the unit. If power-on test is successfully completed, The reader will turn on both LEDs for approximately 1 second and sound the buzzer for 1 short beep; then the reader is ready for normal operation.

80.5 Status LEDs

The reader has two blinking LEDs which signify its status:

Mode or Status	Behavior of LEDs
Card and PIN	Blinking red light
Card Only	Blinking red light
Card or PIN	Blinking red light
Cipher Lock Emulation	Blinking red light
Facility Code	Blinking red light
Locked	Steady red light
Unlocked	Steady green light
Access Granted	Blinking green light, two beeps
Access Denied	Steady red light, three beeps
Waiting for PIN	Both green and red lights blink simultaneously at half intervals for ten seconds
Waiting for second card	Green and red lights blink alternately at half intervals for ten seconds.

80.6 Maintenance

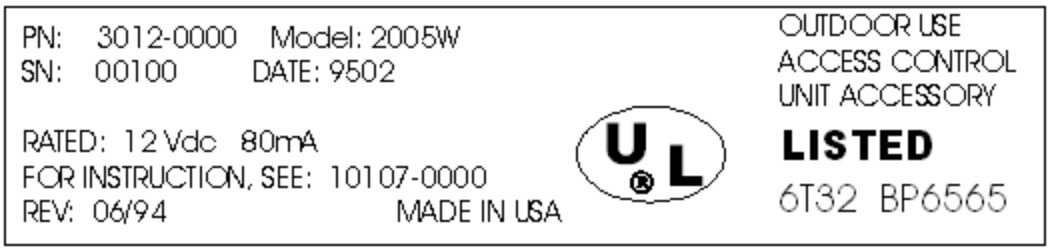
The readers are designed to provide continuous service with minimal routine maintenance. However, contaminants (such as magnetic oxides from badges and dirt) tend to accumulate on the read head. Without regular cleaning, these contaminants will shorten the read head life and increase the probability of card read error. A maintenance schedule should be developed base on the card reader environment (dirty or clean) and the usage frequency (light traffic or heavy traffic). Extreme case may require daily cleaning.

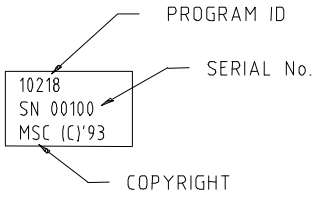
Head cleaning may be done by using disposable, pre-saturated magnetic head cleaning card. These cards are readily obtainable from a number of sources (e.g., Clean Team Co., (805) 581-1000).

The reader exterior surface is covered with high strength polymer and polyester membrane. It may be cleaned with a soft cloth and mild detergent if required.

80.7 Product Identification

Reader product identification is provided on labels. These labels have information on program ID, revision, product ID, supply voltage, and copyright notice. These labels are located on the circuit board and the back of the reader.





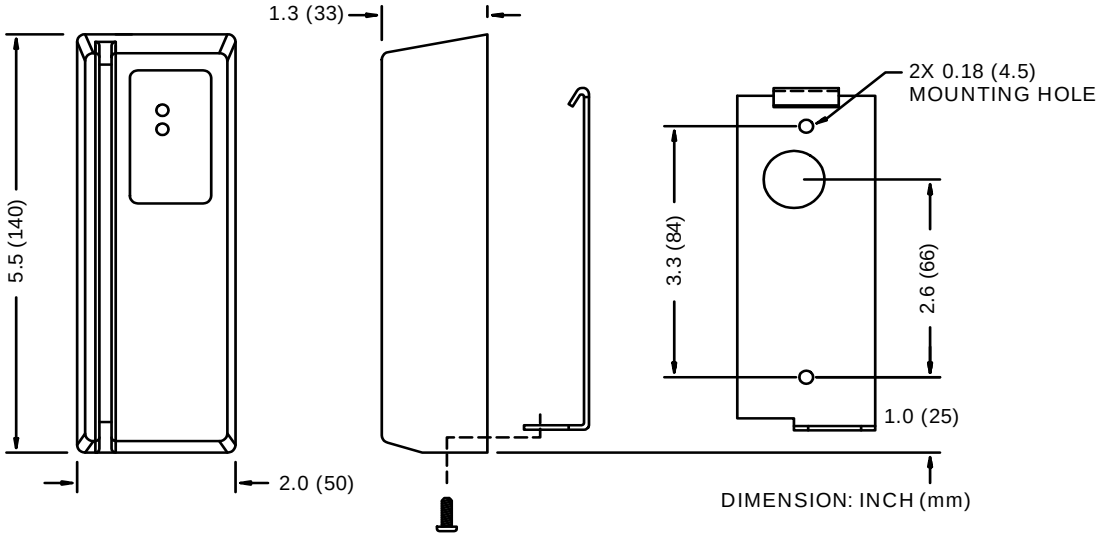
81 Specifications

The reader is for use in low voltage, class 2 circuits only.

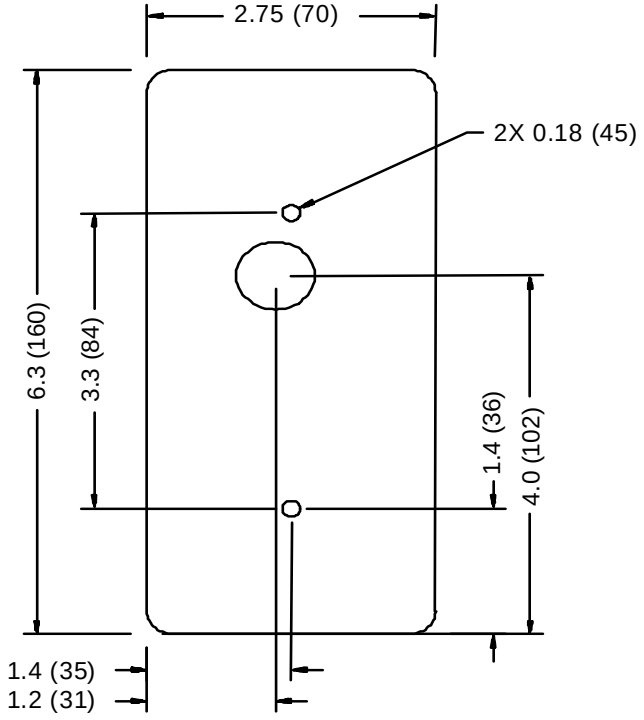
Power:	Voltage	5 Volt Model: 5.8 VDC (4.9 to 6.4 VDC)
		12 Volt Model: 12 VDC (10.2 to 13.8 VDC)
	Current	80 mA (25 mA typical.)
Data output	Data 1/0 pair or clock/data	
	Timing - clock/data -	1 mS period 400 uS setup/hold time typical
	- data 1/0 -	3 mS period 20 µS pulse width typical
LED input	input not driven: LEDs off input > 3.5 VDC: Red LED on input < 0.8 VDC: Green LED on	
Buzzer input:	input not driven or > 3.5 VDC: buzzer off input < 0.8 VDC: buzzer on	
Mechanical	Dimension	1.95 W x 1.30 H x 5.50 L inches (50 W x 33 H x 140 L mm)
	Weight	10 oz. (284 g) nominal
	Material	Case, Die cast aluminum, gray powder coat standard
		Mounting, stainless steel
		Wall plate, 18 CRS, gray powder coat standard
Card	75 bpi, ANSI X4.16, Track 2 standard, Speed 3 to 50 ips	
Read Head	500,000 passes typical, standard. Optional high-wear head available.	To order the high-wear read head, add “-OH” to the part number when you place your reader order.
Distance	500' (152m) with 18 AWG wires	
Environmental	Temperature:	Operating: -40° to +75° C (-40° to +167° F)
	Humidity:	0-95% RHNC, standard 100% (-OW option)
Certifications	UL294 and UL1076 Listed, CE marking, RoHS compliant	

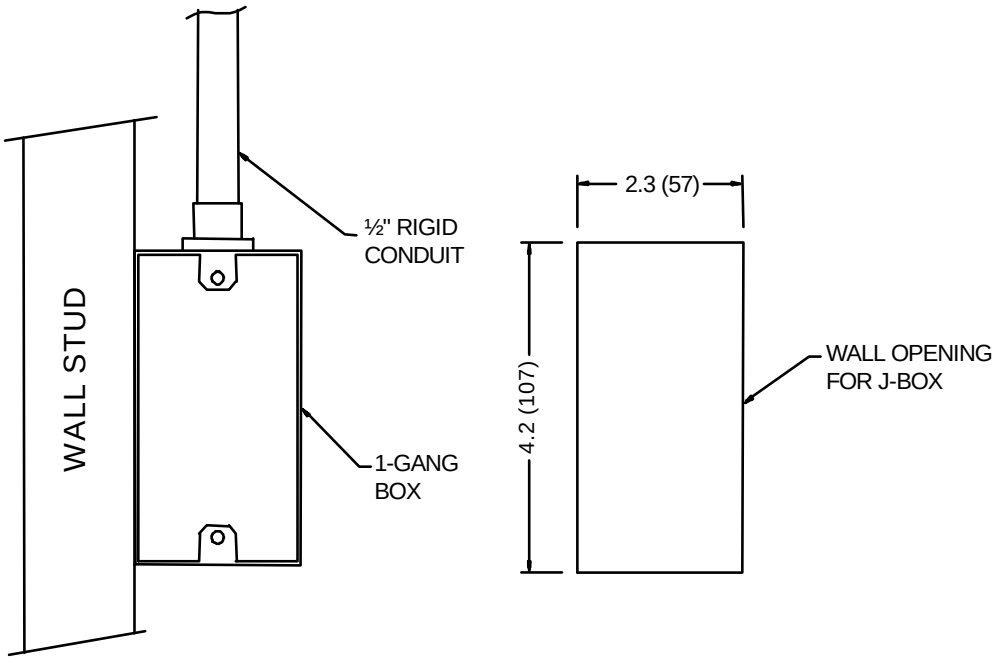
81.1 Reader Mounting Dimensions

Optional Wall Plate, WP-10



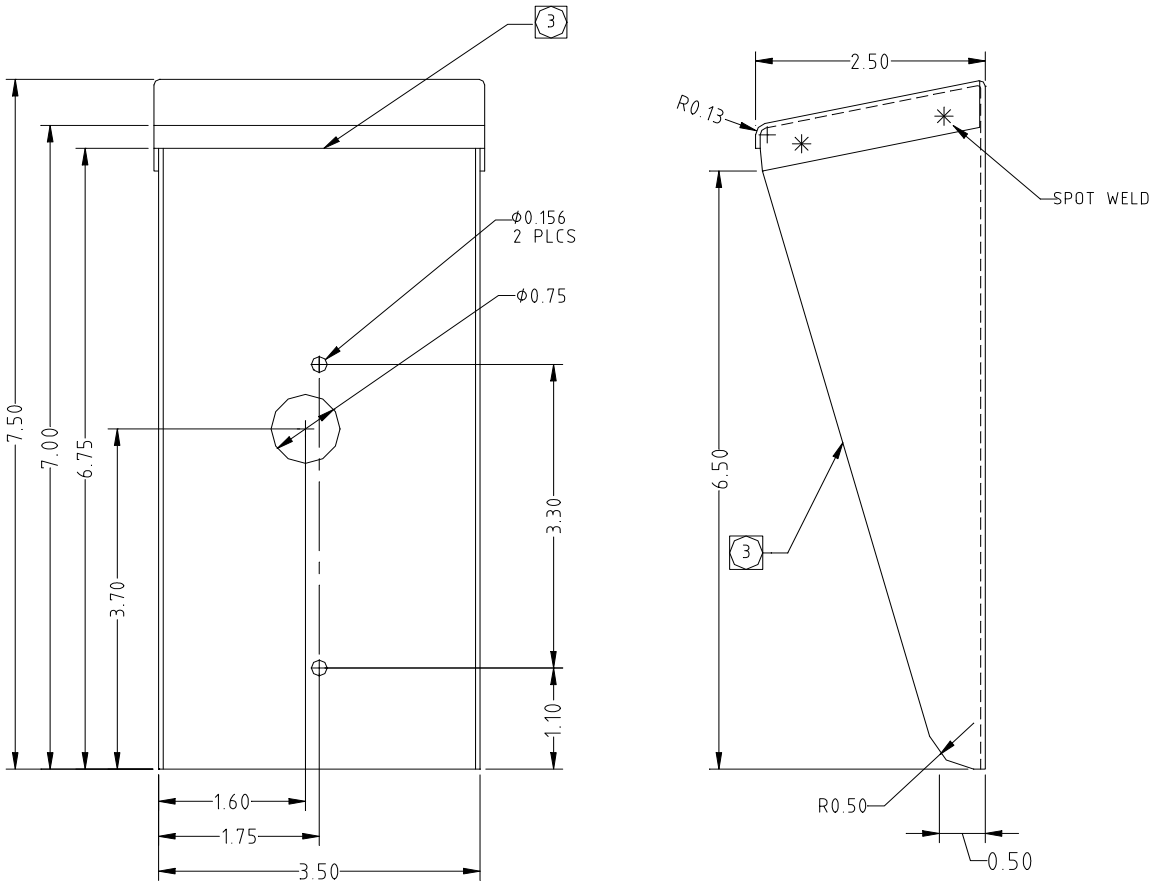
Fitting Rigid Conduit to Junction Box




WALL STUD
½" RIGID
CONDUIT
1-GANG
BOX
2.3 (57)
4.2 (107)
WALL OPENING
FOR J-BOX

81.2 Reader Weather Shield

Weather Shield – part number LNL-WS10



3 EXPOSED EDGES (FRONT AND TOP) MUST BE ROUNDED/SMOOTHED, RADIUS 0.015 TYP.

2. FINISH: CLEAN AND DEBUR. SAND TO BREAK ALL EDGES.
   BRUSH FINISH TOP/SIDE SURFACES (200 GRIT). GRAIN VERTICAL.

1. MATERIAL: STAINLESS STEEL, TYPE 304-2B, 18GA

NOTES: UNLESS OTHERWISE SPECIFIED

LNL-2010W/2020W/2020W-NDK/NDKV2 MAGNETIC CARD ACCESS READER

82 Overview

This installation guide is intended for use by technicians who will be installing and maintaining LNL-2010W, LNL-2020W, LNL-2020W-NDK, LNL-2020W-NDKV2 Magnetic Card Access Readers.

OnGuard Magnetic Card Access Readers are durable, dependable, convenient and competitively priced. The Magnetic Card Access Readers are available in both 5 VDC and 12 VDC models. The LNL-2010W is magnetic swipe only and the LNL-2020W/NDK/V2 includes a twelve-position keypad. The reader's are in fully weatherized metal casing shell, which provides strength and durability. The readers are first treated with and anti-corrosion film and then coated with a tough abrasion resistant finish, available with a beige or black textured finish, which compliments any interior or external decor. The readers accept low and high coercivity magnetic stripe cards. Track 2 magnetic readers are standard with optional Track 1 or Track 3 readers available.

The reader communicates to the Intelligent System Controller (ISC) through one of two reader interface modules. The single or dual reader interface modules interprets the Wiegand communication (Data 1/Data 0 or Clock and Data) from the reader and sends the signal via RS-485 back to the ISC. The reader can be located up to 500 feet (152.4 m) away from the reader interface module.

83 Installation

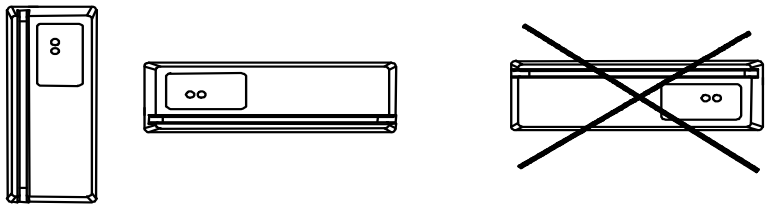
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

83.1 Wiring

The reader has an RJ-45 modular jack for easy field connection. A small piece of pre-terminated cable is supplied with each standard reader for field wiring. The pre-terminated cable has non-standard color. Refer to pin number if the pre-terminated cable is not used. Cable with wires of 24 AWG or larger, 6 conductor (Belden 9536 or equivalent) are recommended for field wiring.

83.2 Mounting the Reader

Find a suitable location to anchor the reader mounting bracket. The reader may be mounted vertically or horizontally. See recommended orientation. The mounting of the reader does not require a junction box. However, rigid conduit is required for outdoor application. A single gang junction box may used to provide transition to rigid conduit. If a single gang junction box is used, a wall plate (optional) may be used to cover the junction box. The reader is then secured to the mounting bracket using a screw. Refer to figures for reader dimensions and typical junction box usage.

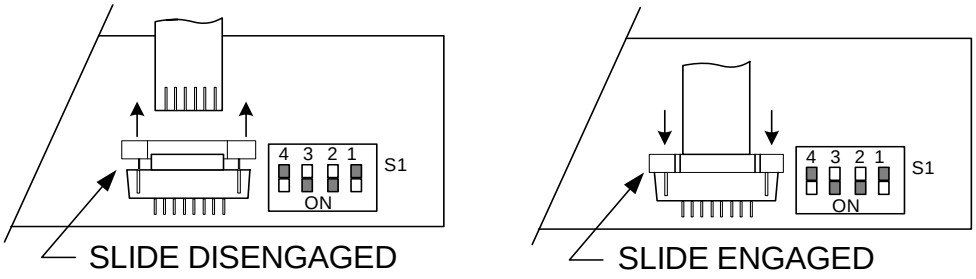


Recommended	Not Recommended

83.3 Connecting the Keypad (LNL-2020W/NDK/V2 only)

Some reader models provide a 12-key keypad for PIN entry. The flex tail of the keypad is connected to the electronic board via a ZIF (Zero Insertion Force) connector. The contacts are engaged/disengaged by a moving slide. Care must be exercised when connecting and disconnecting the keypad. When connecting the keypad to the board, open the slide as shown. Insert the electronics into the housing and insert flex tail in the

ZIF connector. Then, close the slide to engage the contacts. To disconnect the keypad, follow the previously described steps in reverse.

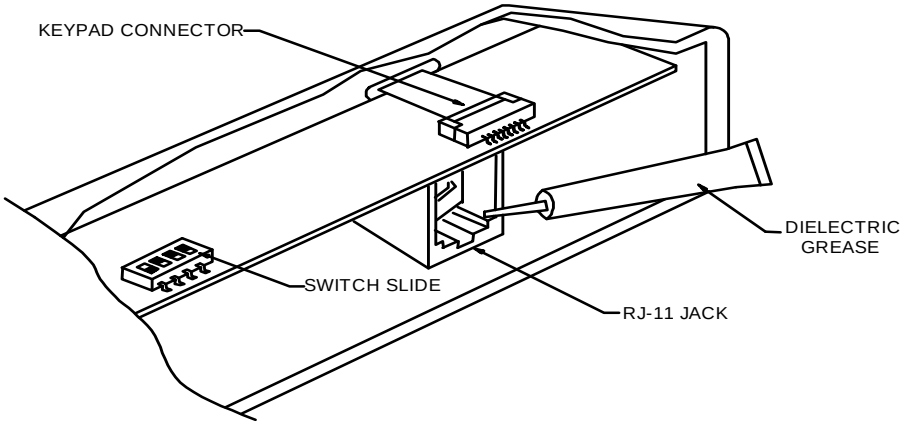


Caution: DO NOT DISCONNECT KEYPAD WITHOUT DISENGAGING THE CONNECTOR!

83.4 Weatherproofing the Reader

The reader is rated to operate over extended temperature. All readers are shipped weatherized, and the electronics are conformal coated against moisture. A tube of dielectric grease is supplied for the installer to coat field connections. After field connection/configuration is made, the grease is to be applied on the DIP switch slides, keypad connection, the RS-485 termination, and the RJ-45 jack to seal off moisture.

Do not use sealant to seal reader case to wall. Doing so will trap water in the reader and may cause damage to the reader.



Be sure to clean the read head(s).

The leading cause of accelerated read head wear is contamination in the read head slot. To maximize the life of the read head, it is important to clean the reader periodically to remove any contamination. The frequency depends on the environment in which the reader is located. Indoor readers in controlled environments will need to be cleaned much less often than an outdoor reader exposed to airborne dirt and debris. Dirt and debris are also transferred from cardholder cards that have been contaminated with sticky substances. Read head cleaning cards are available to clean the readers.

For heavy traffic areas, extended life read heads are also available from the factory at the time of order which will extend the read head life up to 1 million card swipes. For heavy traffic, outdoor readers should be cleaned at least once per month. A good indication as to how often a reader needs to be cleaned is when using a cleaning card, if the card has no visible signs of contamination, the reader could be serviced less often. Another indication is if the card reader, starts to give invalid card reads, the reader may need to be serviced more often. A read head that is starting to fail due to exceeding the maximum number could cause this or card reads on the read head (std. 600,000 or extended 1million).

Weather Shield Option – even though the Magnetic swipe card readers are fully weatherized, there are still times when the card reader may need more protection from the environment. If a reader has been installed at a remote parking lot or on a build with no overhang to prevent rain, ice or snow from building up in the reader throat, you may want to install the weather shield (LNL-WS10). This weather shield can be used with all LNL-2005W, 2010W, 2020W, and 2020W-NDK readers.

84 Configuration

84.1 Standard Format Code Summary

The following formats are supported in standard models.

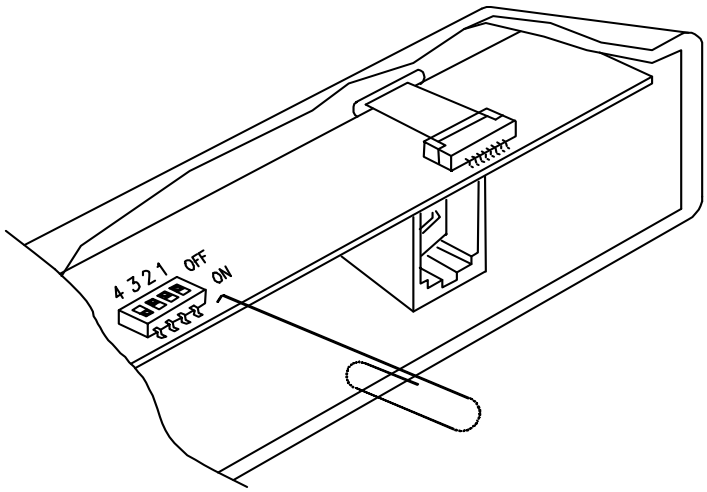
Unless otherwise indicated, the LED input line controls both LEDs (low=green, high=red); the BUZZER input controls the buzzer (low = activate); a good read is signaled by a flash of the green LED; a bad read is signaled by a flash of the red LED and a double beep of the buzzer.

<table>
<tr><td>Format 0</td><td colspan="6">32-bit Wiegand compatible output from standard Northern Computer mag card. 16-bit facility code and 16-bit user ID. Reverse read and error filter is enabled. No tamper monitor.</td></tr>
<tr><td>Format 1</td><td colspan="6">basic magnetic data output: send track 2 data without any verification or formatting using clock/data signaling. (All reads are “good,” card data is sent as is.) Tamper monitor is disabled.</td></tr>
<tr><td>Format 2</td><td colspan="6">magnetic data output with zero trim using clock/data signaling. (All reads are “good,” trims excess zero bits, otherwise sends data as is.) Tamper monitor is enabled.</td></tr>
<tr><td>Format 3</td><td colspan="6">magnetic data output with zero trim, reverse read correction, and error filter enabled using clock/data signaling. Tamper monitor is disabled.</td></tr>
<tr><td>Format 4</td><td colspan="6">26-bit Wiegand (8-bit facility code and 16-bit ID) compatible output from cards with 8 or more digits or AMC encoding. See Format 5 for digit usage.</td></tr>
<tr><td>Format 5</td><td colspan="6">34-bit Wiegand (12-bit facility code and 20-bit ID) compatible output from cards with 8 or more digits or AMC encoding. Tamper monitor is disabled.</td></tr>
<tr><td></td><td>Digits in mag card</td><td colspan="3">Facility Code</td><td colspan="2">User ID</td></tr>
<tr><td></td><td></td><td>Digits</td><td>26-bit Range</td><td>34-bit Range</td><td>Digits</td><td>26-bit Range</td><td>34-bit Range</td></tr>
<tr><td></td><td>8</td><td>1-3</td><td>000-255</td><td>000-999</td><td>4-8</td><td>00000-65535</td><td>00000-99999</td></tr>
<tr><td></td><td>9</td><td>1-3</td><td>000-255</td><td>000-999</td><td>4-9</td><td>000000-065535</td><td>000000-999999</td></tr>
<tr><td></td><td>10</td><td>1-4</td><td>0000-0255</td><td>0000-4097</td><td>5-10</td><td>000000-065535</td><td>000000-999999</td></tr>
<tr><td></td><td>11 or more</td><td>1-5</td><td>00000-00255</td><td>00000-04097</td><td>6-11</td><td>000000-065535</td><td>000000-999999</td></tr>
<tr><td></td><td>AMC card</td><td>1-6</td><td>000000-000255</td><td>000000-004097</td><td>7-12</td><td>000000-065535</td><td>000000-999999</td></tr>
<tr><td>Format 6</td><td colspan="6">26-bit Wiegand compatible output from standard Northern Computer magnetic card. The lower 8 bits of the 16-bit facility code is used as facility code. The 16-bit user ID is unaltered. Reverse read and error filter is enabled. No tamper monitor.</td></tr>
<tr><td>Format 7</td><td colspan="6">magnetic data output with zero trim and reverse read correction using data 1/data 0 signaling. The tamper monitor is disabled.</td></tr>
</table>

Format T	(factory test) magnetic data output: verify track 2 data and send track 2 data without formatting using clock data signaling. Zero trim, reverse read, bad card filter, and tamper monitor option are enabled.

84.2 DIP Switch/Jumper Setting

All readers are equipped with DIP switches for configuration/parameter setting. DIP switches are set by moving the slide to on/off position using a small tool (may be made from a paper clip). Remove the top mounting bracket to access the DIP switches.



The DIP switches/jumpers on the LNL-2010/2020 reader are used to select a preset format. This preset format determines how the card is interpreted, the functions for the LED and buzzer, and the output signal format, etc. Refer to format specification for details.

Switch/Jumper Position

FORMAT	DIP SWITCH			
	4	**3**	**2**	**1**
format 0	ON	ON	ON	ON
format 1	ON	ON	ON	off
format 2	ON	ON	off	ON
format 3	ON	ON	off	off
format 4	ON	off	ON	ON
format 5	ON	off	ON	off
format 6	ON	off	off	ON
format 7	ON	off	off	off
format T (factory reserved)	off	off	off	off

All other combinations are reserved.

ON = switch is set to ON or jumper is uncut.

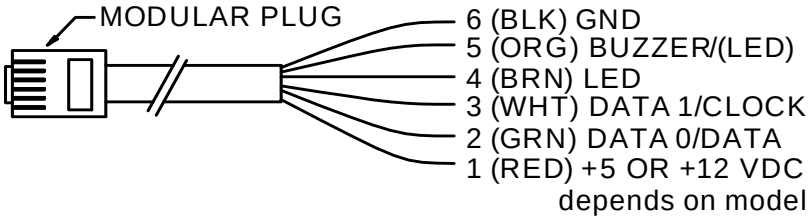
84.3 Keypad Data and Tamper Monitor Signaling

Keypad data and tamper monitor status are transmitted on the data lines as 8-bit blocks. They are encoded and sent using the same signaling method as selected for the card data output (clock/data or data 1/data 0). Card data, tamper status data, and keypad data blocks are separated by a minimum of 100 milliseconds. See following for codes:

10110000 - 0 (ASCII '0', odd parity, MSB first)	00110001 - 1 (ASCII '1', ...)
00110010 - 2 (ASCII '2', ...)	10110011 - 3 (ACSII '3', ...)
00110100 - 4 (ASCII '4', ...)	10110101 - 5 (ASCII '5', ...)
10110110 - 6 (ASCII '6', ...)	00110111 - 7 (ASCII '7', ...)
00111000 - 8 (ASCII '8', ...)	10111001 - 9 (ASCII '9', ...)
00101010 - * (ASCII '*', ...)	00100011 - # (ASCII '#', ...)
11010011 - SAFE (ASCII 'S', ...)	01010100 - ALARM (ASCII 'T', ...)

84.4 TTL Interface

The TTL interface has the standard 6-wire interface widely used in the access control application. In addition, an input to control the buzzer is provided. Cable with minimum of 24 AWG wires should be used.



84.4.1 Use with a WRI Reader

To use the LNL-2020W with a Recognition Source reader, this reader must be set to format 3 (DIP switches 3 and 4 are turned on).

In System Administration, configure the reader as Mag w/ Wiegand output.

84.5 Grounding the Reader

To avoid having ESD (electrostatic discharge) interfering with the operation of the reader, the reader casing shall be grounded. This can be accomplished be tying the mounting bracket to earth ground locally (e.g. grounded conduit).

84.6 Reader Verification

The reader performs a self-test when power is first applied to the unit. If power-on test is successfully completed, The reader will turn on both LEDs for approximately one second and sound the buzzer for one short beep. Then the reader is ready for normal operation.

If further verification of the reader hardware is needed, the reader may be temporarily set to format T. With this format selected, the reader will read and verify standard ANSI track 2 encoded card. If no read error is detected, the green LED will flash. Otherwise, the red LED will flash and the buzzer will sound two short beeps to indicate error. The LED input can be used to verify the LED function, and the buzzer input for the buzzer function. For MR-20, the reader will echo a key press with a brief flash of both LEDs and a short beep of the buzzer. Reset to the required format for normal operation after test.

84.7 Status Indicators

The reader has two blinking LEDs which signify its status:

Mode or Status	Behavior of LEDs
Card and PIN	Blinking red light
Card Only	Blinking red light
Card or PIN	Blinking red light
Cipher Lock Emulation	Blinking red light
Facility Code	Blinking red light
Locked	Steady red light
Unlocked	Steady green light
Power Up Condition	Green, red, and beep
Access Granted	Blinking green light, two beeps
Access Denied	Steady red light, three beeps
Waiting for PIN	Both green and red lights blink simultaneously at half intervals for ten seconds
Waiting for second card	Green and red lights blink alternately at half intervals for ten seconds.
Extended held open mode	Beeps during pre-alarm

84.8 Maintenance

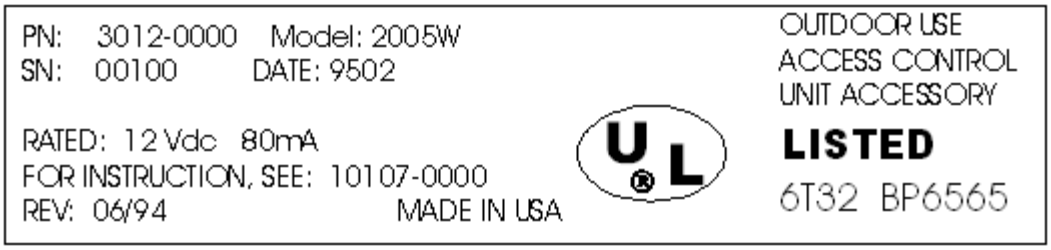
The readers are designed to provide continuous service with minimal routine maintenance. However, contaminants (such as magnetic oxides from badges and dirt) tend to accumulate on the read head. Without regular cleaning, these contaminants will shorten the read head life and increase the probability of card read error. A maintenance schedule should be developed base on the card reader environment (dirty or clean) and the usage frequency (light traffic or heavy traffic). Extreme case may require daily cleaning.

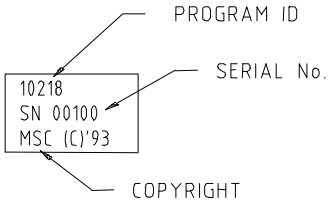
Head cleaning may be done by using disposable, pre-saturated magnetic head cleaning card. These cards are readily obtainable from a number of sources (e.g., Clean Team Co., (805) 581-1000).

The reader exterior surface is covered with high strength polymer and polyester membrane. It may be cleaned with a soft cloth and mild detergent if required.

84.9 Product Identification

Reader product identification is provided on labels. These labels have information on program ID, revision, product ID, supply voltage, and copyright notice. These labels are located on the circuit board and the back of the reader.



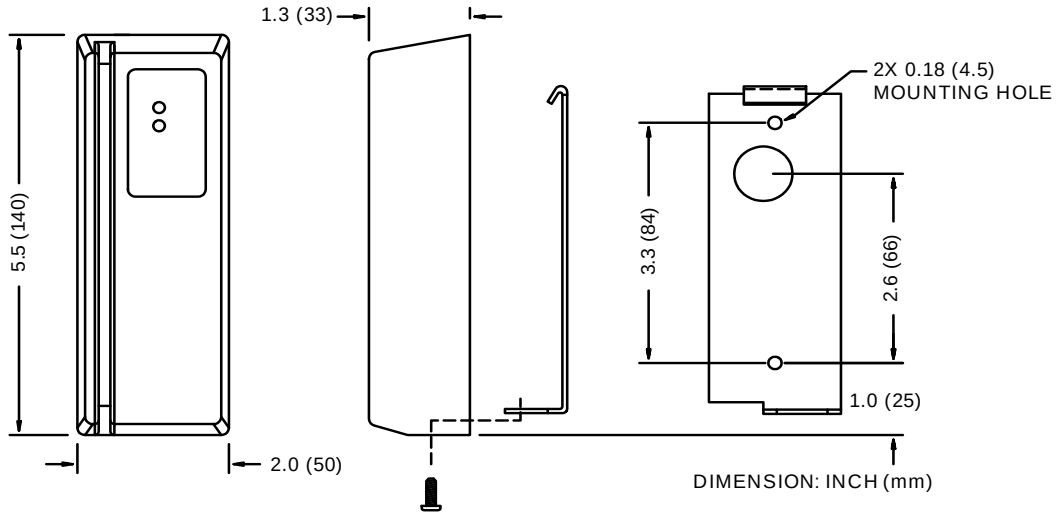


85 Specifications

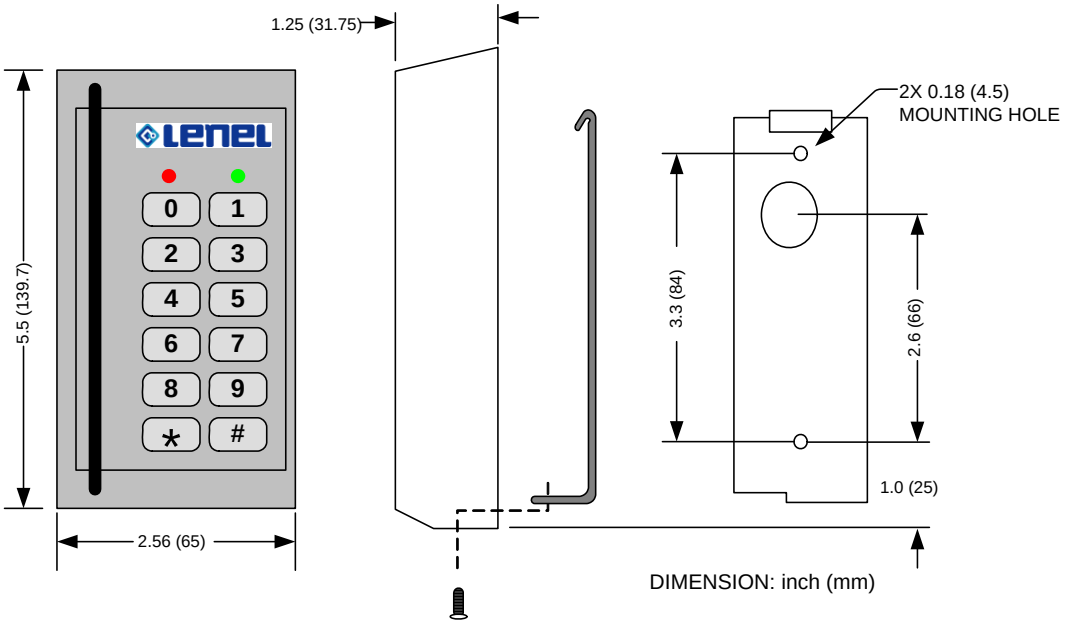
The reader is for use in low voltage, class 2 circuits only.

Power:	Voltage	5 Volt Model: 5.8 VDC (4.9 to 6.4 VDC)
		12 Volt Model: 12 VDC (10.2 to 13.8 VDC)
	Current	80mA (25mA typical.)
Data output	Data 1/0 pair or clock/data	
	Timing - clock/data -	1 mS period 400 uS setup/hold time typical
	- data 1/0 -	3 mS period 20 µS pulse width typical
LED input	input not driven: LEDs off input > 3.5 VDC: Red LED on input < 0.8 VDC: Green LED on	
Buzzer input:	input not driven or > 3.5 VDC: buzzer off input < 0.8 VDC: buzzer on	
Mechanical	Dimension	1.95 W x 1.30 H x 5.50 L inches (50 W x 33 H x 140 L mm)
	Weight	10 oz. (284 g) nominal
	Material	Case, Die cast aluminum, gray powder coat standard
		Mounting, stainless steel
		Wall plate, 18 CRS, gray powder coat standard
Card	75 bpi, ANSI X4.16, Track 2 standard, Speed 3 to 50 ips	
Read Head	500,000 passes typical, standard. Optional high-wear head available.	To order the high-wear read head, add “-OH” to the part number when you place your reader order.
Tamper Switch	(Optional)	To order the tamper switch, add “-OT” to the part number when you place your reader order.
Distance	500' (152m) with 18 AWG wires	
Environmental	Temperature:	Operating: -40° to +75° C (-40° to +167° F)
	Humidity:	0-95% RHNC, standard 100% (-OW option)
Certifications	UL294 and UL1076 Listed, CE marking, RoHS compliant	

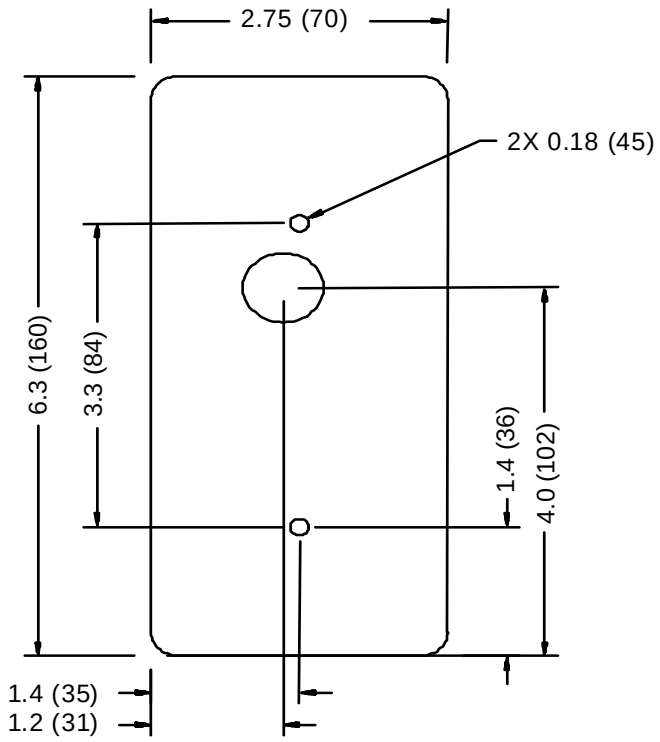
85.1 Reader Mounting Dimensions



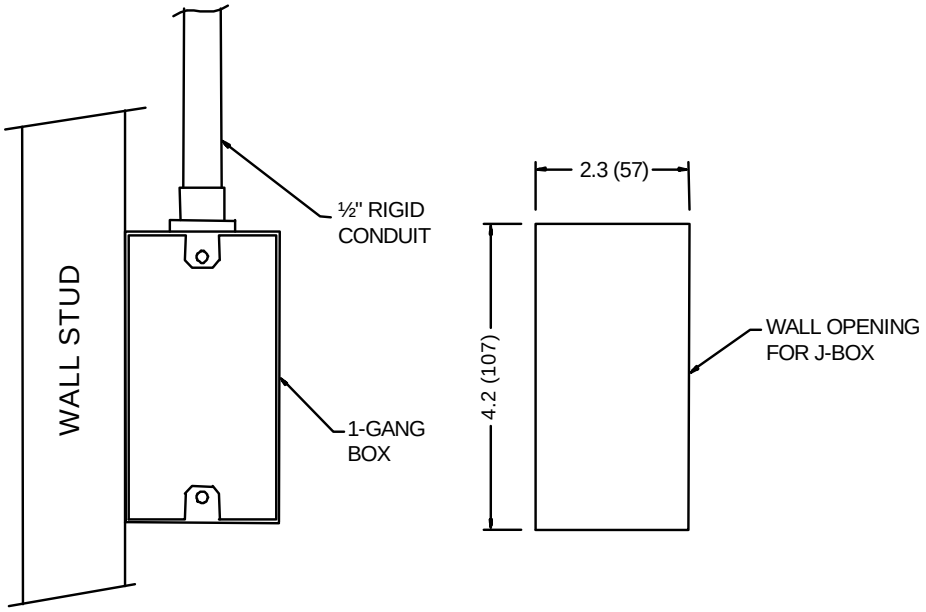
Mounting dimensions for the LNL-2020W-NDK



Optional Wall Plate, WP-10

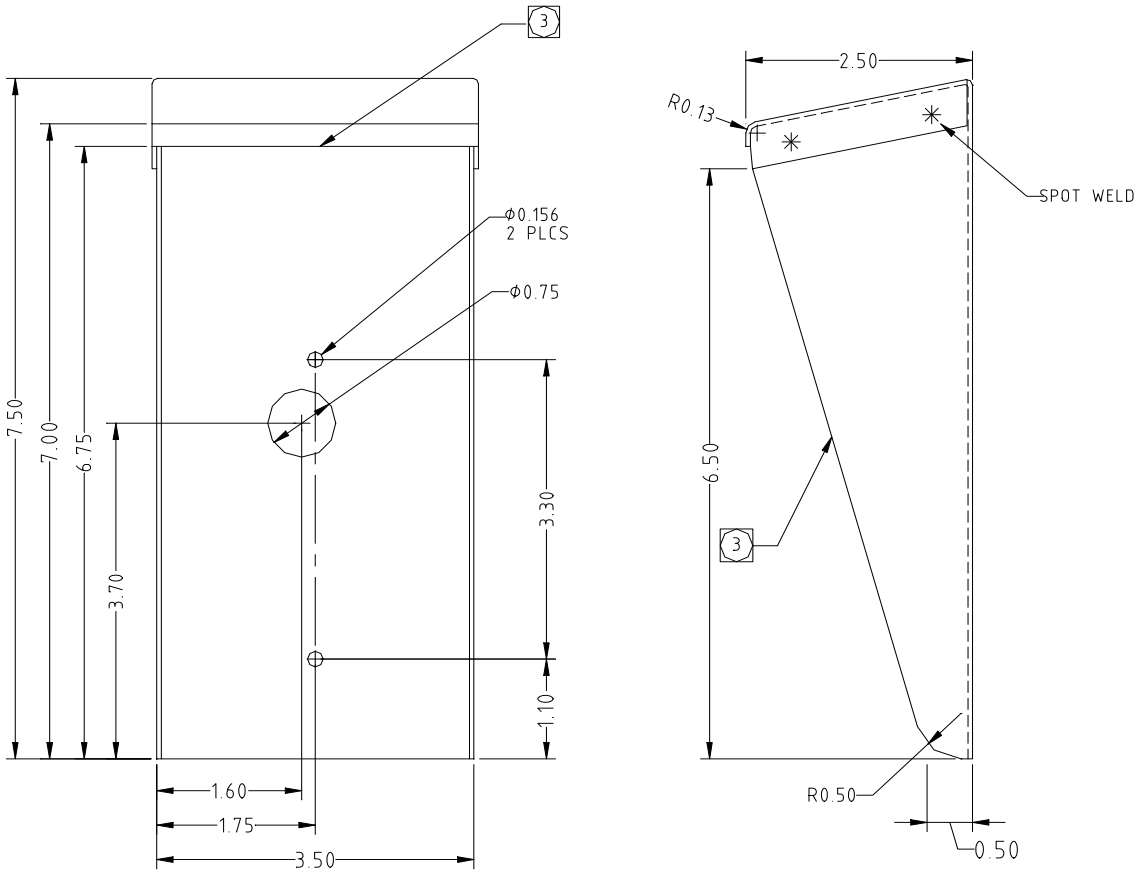


Fitting Rigid Conduit to Junction Box



85.2 Reader Weather Shield

Weather Shield – part # LNL-WS10



3 EXPOSED EDGES (FRONT AND TOP) MUST BE ROUNDED/SMOOTHED, RADIUS 0.015 TYP.

2. FINISH: CLEAN AND DEBUR. SAND TO BREAK ALL EDGES.
   BRUSH FINISH TOP/SIDE SURFACES (200 GRIT). GRAIN VERTICAL.

1. MATERIAL: STAINLESS STEEL, TYPE 304-2B, 18GA

NOTES: UNLESS OTHERWISE SPECIFIED

LENELPROX READERS

86 LenelProx Readers

LenelProx readers are radio-frequency proximity readers (with or without integrated keypads). OnGuard currently supports the following models:

- LenelProx LPMM-6800
- LenelProx LPSP-6820
- LenelProx LPKP-6840 and BT-LPKP-NDK
- LenelProx LPSR-2400
- LenelProx LPRKP-4600
- LenelProx LPMR-1824 and LPMR-1824 MC
- LenelProx LPLR-911

The *RFID* (Radio Frequency Identification) readers, or proximity readers, use radio frequency to identify, locate, and track people and objects that carry the appropriate transponders. Proximity readers can work in non-line-of-sight situations.

A typical proximity system consists of three components – an interrogator (reader), a transponder (card, keytag, etc.), and a data processing panel and/or computer combination. Most RFID readers have an internal micro-controller, a transmitter, a receiver and a shared transmit/receive antenna.

The credential is usually passive and consists of an antenna and an RFID *ASIC* (Application Specific Integrated Circuits). During operation, the reader sends out an electromagnetic wave to establish a zone of surveillance. When a card enters this zone, the electromagnetic energy from the reader interacts with the IC in the tag. Once the IC is energized, it goes through an initialization process and begins to broadcast its identity. This process utilizes a low-energy back-scattering technology that selectively reflects or back-scatters the electromagnetic energy back to the reader. The circuits in the reader receive and decode this back-scattered signal and determine the identity of the tag.

86.1 Read Range

To measure the read distance between the reader and card, grasp the card by the corner or near the slot and move the card slowly toward the reader, with the card surface parallel to the reader until a beep occurs. The beep indicates that the reader detects and reads the card. In order the read again, the card must be fully withdrawn from the reader's field of surveillance and then presented again. During normal operation, the card can be presented at any angle relative to the reader; however, this will result in slight variation of read range.

Note: Waving the card in front of the reader will result in a diminished read range.

86.2 Installation Guidelines

Conduct a site survey before starting installation to avoid possible sources of interference. If the reader is not installed properly, the performance will be degraded. Reader damage is also possible.

- Do not install the reader in an area where sources of broadband noise may exist. (Examples of broadband noise sources: motors, pumps, generators, AC switching relays, light dimmers, CRTs, induction heater, etc.)
- Do not bundle the reader wires together in one conduit with the AC power cables, lock power, and other signal wiring.
- Keep all the reader wiring at least 12 inches (30 cm) away from all other wiring, which includes, but it not limited to, AC power, computer data wiring, telephone wiring, and wiring to electrical locking devices.
- Do not install the reader within 24 inches (60 cm) of a computer CRT terminal.
- Make sure that the supply voltage of the reader is within specification. As a rule of thumb, higher supply voltage results in longer read range but at the expense of higher power consumption.
- Use cables with overall shield (screen).
- For best results, run the cable in an individual conduit with at least 12 inches distance from the AC power, computer data cables, and cables for electrical locking devices.
- Use recommended cable. Do not use any unshielded “twisted pair” type cable.
- Use the largest wire gauge possible.
- Use dedicated and linearly regulated power supply, where applicable.
- Use Single Point Grounding (Earthing). Do not use ground loops.

86.2.1 General Wiring Requirements

All the reader wiring must be continuously shielded. Use 22 AWG up to 18 AWG, six or seven-conductor shielded cables. Longer distances and higher current consumption on the power supply line will require larger gauge wires.

86.2.2 Power

The operating frequency of a typical power supply ranges from 15 to 50 kHz. It will usually generate wideband-switching noises. Some of its harmonics may fall on or near the operating frequency of the reader, 125 kHz. Therefore, avoid using a switching power supply at all times. Void using a single power supply for reader and the magnetic lock. Doing so will affect reader operation and may cause damage to the reader.

Note: When using an external power supply, always use a linear power supply. Do NOT use a switching power supply.

If a LenelProx reader is disconnected from the power supply and then reconnected, the readers will not read the initial card presented. Subsequent cards will be read as usual.

86.2.3 Grounding

Grounding is critical for proper operation of the reader. When installing the reader, it is crucial to assure that the earth ground is the best ground available. If you elect to use the AC main power ground, conduct a test by measuring its resistance relative to a known good ground, such as a cold water pipe or a structural steel member that is in direct contact with the ground. This resistance should be less than 50 ohms. If you find that the AC main power does not provide adequate earth ground, try using a solid connection to a cold water pipe or for best results drive your own copper-clad ground rod into the earth for the ground point.

For multiple reader installations, it is critical that all readers are connected to a single ground point. Using multiple ground points will create secondary current paths or ground loops that can affect the performance and cause damage to the reader.

86.2.4 Wiring

Some of these readers are designed for Wiegand and RS-232 standard communication formats. If an external power supply is being used, leave the panel's Ground and Power terminals open and connect the readers Ground (Black) and 5-12 VDC (Red) terminals to the external power supply.

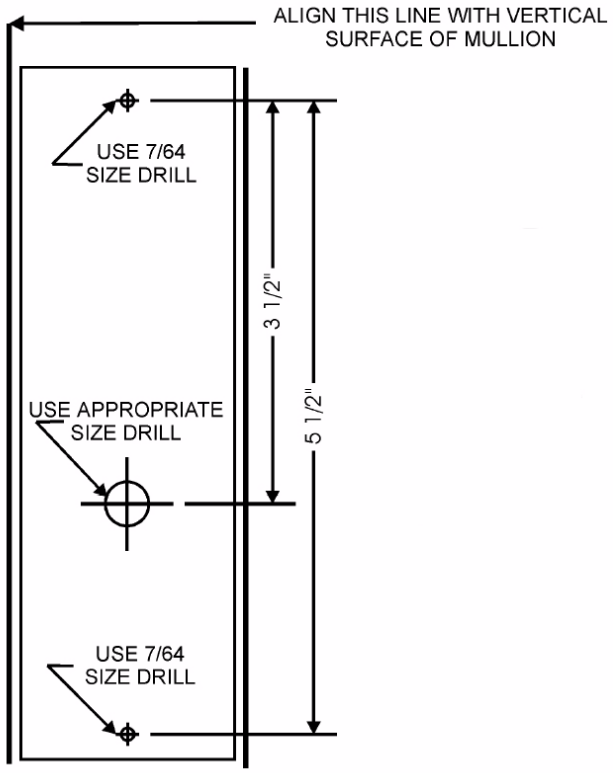
86.3 LenelProx LPMM-6800

The LenelProx LPMM-6800 mullion mount reader is a radio-frequency proximity reader. The reader consists of a transmit/receive antenna, associated electronics, and a polycarbonate housing that encloses the antenna and the electronics. The housing is potted with epoxy to protect the components. The reader may be mounted on a metal door frame or flat surface (wall, housing, etc.).

86.3.1 Installation

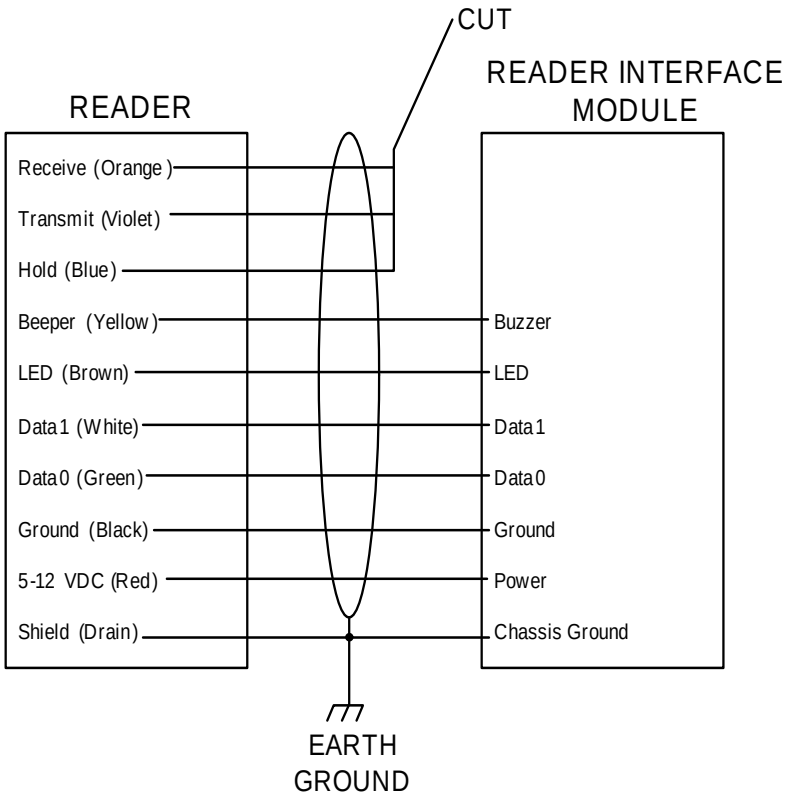
1. Position the reader at the desired mounting height on the metal door frame. Observe ADA height requirements. Drill two 7/64 (0.109)-inch holes for the reader, and one clearance hole for the cable.

Holes location


ALIGN THIS LINE WITH VERTICAL SURFACE OF MULLION
USE 7/64 SIZE DRILL
3 1/2"
5 1/2"
USE APPROPRIATE SIZE DRILL
USE 7/64 SIZE DRILL

2. Clip off the white connector from the end of the reader's cable. Keep the wires as long as possible.
3. Connect the reader to the access control panel according to the following figure. Tape or cap the unused wires singly.

Wiring diagram (Wiegand)



4. Use a regulated linear power supply, between 5 volts (50 mA peak) and 12 volts DC (80 mA peak).
5. Align the reader with the screw holes in the frame. Attach the reader to the frame with screws.
6. Power up the reader. The LED is steady amber (the beeper does not sound).
7. Present any Lenel proximity credential (card, keytag, or wafer) briefly to the reader. This initializes the reader and prepares it for reading cards authorized for the door or gate. The reader sounds a single short beep. The LED is steady red to indicate standby mode.
8. The LED color in standby may be changed from red to green, or from green to red, using a Color Changer card, available from Lenel.
   Remove power from the reader for a few seconds, then restore power. While the LED is Amber, present the Color Changer card to toggle the LED color at standby.
9. The LED standby mode may be changed from blinking red to steady red, or from steady red to blinking red, using an LED Mode Changer card, available from Lenel (part # LB-E).
   Remove power from the reader for a few seconds, then restore power. While the LED is Amber, present the LED Mode Changer card to toggle the LED mode at standby.

Note: In order to use this feature, the reader must be rev. LB. Previous revisions (C8, D, L, LA) of the LenelProx readers do not have this feature and cannot be upgraded.

10. When installation is complete, insert screw-hole plugs into the screw clearance holes to conceal the screw heads.
    Screw-hole plugs are for one-time use. After they are seated, they cannot be removed without damaging the plugs.

86.3.2 Specifications

- Cable to Controller
  - 6 conductor (not twisted pair), stranded, 22 AWG, color-coded insulation, overall shielded
  - Length: up to 500 feet
- Read Range (metal compensated)
  - 5 VDC: typically 6 inches (15 cm)
  - 12 VDC: typically 8 inches (20 cm)
- Operating Parameters
  - Operating temperature: -35° to 65° C (-31° to 150° F)
  - Operating humidity: 0 to 95% non-condensing
  - Excitation frequency: 125 kHz
  - Wiegand output: 26 to 50 bits (determined by code in credentials)

Notes: The beeper sounds as described even if the yellow wire is not connected to the controller.

The Beeper, Hold, and LED lines are logic levels. Never apply power to them. They may be pulled to a low level (0 to 1.2 VDC) to enable their function, and left floating at a high level (3.6 to 5.0 VDC) when not used.

LPMM-6800 readers have both Wiegand and RS-232 interfaces.

- Certifications
  - UL Listed
  - FCC Part 15
  - Industry Canada
  - RoHS compliant

86.4 LenelProx LPSP-6820

The LPSP-6820 reader is a radio-frequency proximity switchplate reader. The reader consists of a transmit/receive antenna, associated electronics, and a polycarbonate housing that encloses the antenna and the electronics. The housing is potted with epoxy to protect the components. The reader may be mounted like a cover plate on a single-gang electrical utility box, or on a flat surface (wall, housing, etc.).

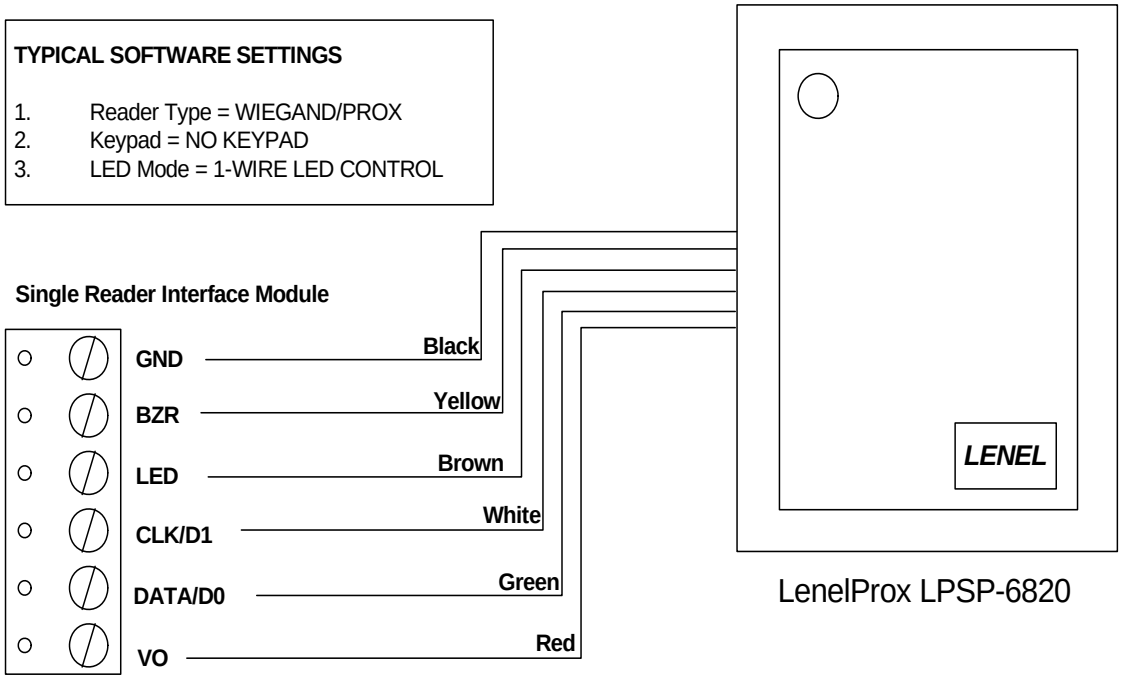
86.4.1 Installation

1. Install a single-gang utility box, or drill two no. 27 (0.144)-inch clearance holes for the reader and one hole for the cable, at the desired mounting height. Observe ADA height requirements.

2. Snap open the reader's top cover by inserting a screwdriver blade into the slot at the bottom edge of the cover, then twisting the blade gently.
3. Connect the reader to the access control panel according to the following figure(s). Tape or cap the unused wires singly.
   - Wiring with reader interface modules:

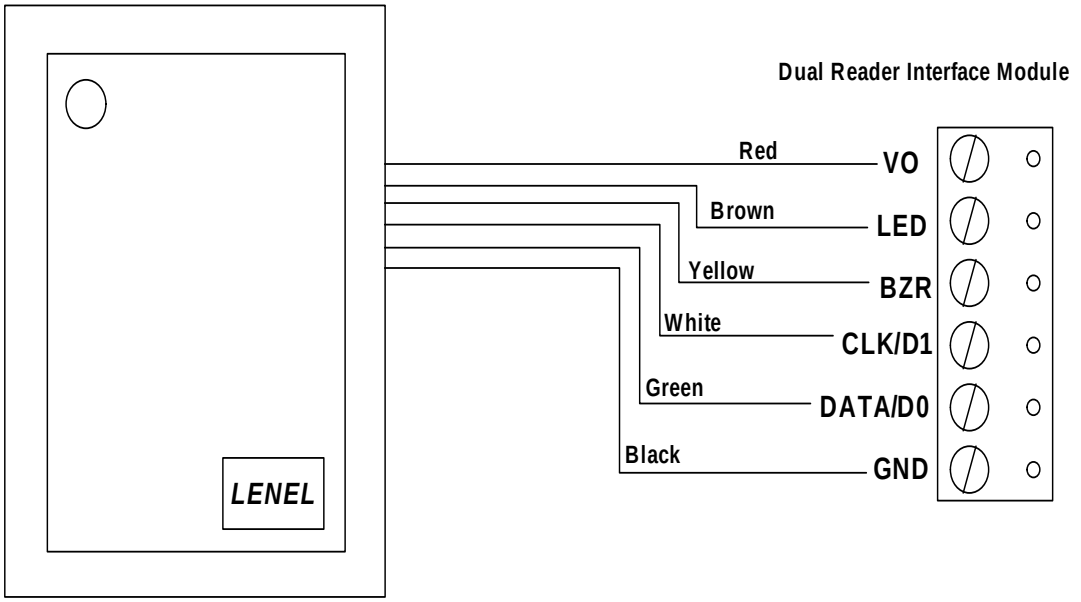
     Use the following diagrams to wire the LenelProx LPSL-6820 with either the single or dual reader interface module. Since the current requirements for these readers range from 40 to 120 mA, this means that the readers can be powered from the reader interface modules.

Wiring the LPSP-6820 and the LNL-1300



For the Dual Reader Interface Module, make sure that jumper J2 is set to unregulated power mode. This will allow the maximum amount of current for the readers.

Wiring the LPSP-6820 and the LNL-1320



TYPICAL SOFTWARE SETTINGS

1. Reader Type = WIEGAND/PROX
2. Keypad = NO KEYPAD
3. LED Mode = 1-WIRE LED CONTROL

4. Use a linear and regulated power supply, between 5 volts (50 mA peak) and 12 volts DC (80 mA peak).
5. Align the reader with the electrical utility box. Attach the reader to the electrical box with screws.
6. Put the reader's top cover in place and snap the housing closed.
7. Power up the reader. The LED is steady amber. (The beeper does not sound.)
8. Present any Lenel proximity credential (card, key tag, or wafer) briefly to the reader. The beeper sounds a single short beep. The LED is steady red to indicate standby mode. This initializes the reader and prepares it for reading cards authorized for this door or gate.

Note: You must use Lenel credentials.

9. If the LED color in standby is green (instead of red), it may be changed to red using a Color Changer card, available from Lenel.
   Remove power from the reader for a few seconds, then restore power. While the LED is amber, present the Color Changer card to toggle the LED color at standby.
10. The LED standby mode may be changed from blinking red to steady red, or from steady red to blinking red, using an LED Mode Changer card, available from Lenel (part # LB-E).

Remove power from the reader for a few seconds, then restore power. While the LED is amber, present the LED Mode Changer card to toggle the LED mode at standby.

Note: In order to use this feature, the reader must be rev. LB. Previous revisions (C8, D, L, LA) of the LenelProx readers do not have this feature and cannot be upgraded.

86.4.2 Specifications

- Cable to Controller
  - 5 to 7 conductors (not twisted pairs), stranded, 22 AWG, color-coded insulation, overall 100% shielded
  - Length: up to 500 feet
- Read Range (metal compensated)
  - 5 VDC: typically 6 inches (15 cm)
  - 12 VDC: typically 8 inches (20 cm)
- Operating Parameters
  - Operating temperature: -35° to 65° C (-31° to 150° F)
  - Operating humidity: 0 to 95% non-condensing
  - Excitation frequency: 125 kHz
  - Wiegand output: 26 to 50 bits (determined by code in credentials)

Notes: The beeper sounds as described even if the yellow wire is not connected to the controller.

The Beeper, Hold, and LED lines are logic levels. Never apply power to them. They may be pulled to a low level (0 to 1.2 VDC) to enable their function, and left floating at a height level (3.6 to 5.0 VDC) when not used.

LPSP-6820 readers have both Wiegand and RS-232 interfaces.

- Certifications
  - UL Listed
  - FCC Part 15
  - Industry Canada
  - RoHS compliant

86.5 LenelProx LPKP-6840 and BT-LPKP-NDK

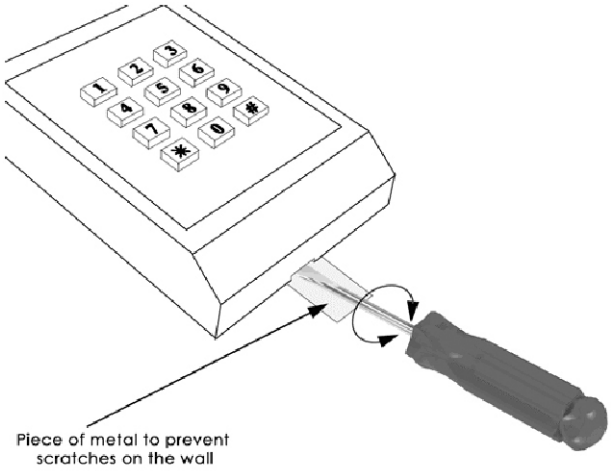
The LenelProx LPKP-6840 reader is a radio-frequency switchplate proximity reader with integrated keypad. The reader consists of a 12-key keypad, transmit/receive antenna, associated electronics, and a polycarbonate housing that encloses the antenna and the electronics. The housing is potted with epoxy to protect the components. The reader may be mounted like a cover plate on a single-gang electrical utility box, or on a flat surface (wall, housing, etc.). The BT-LPKP-NDK has the same features, with an indestructible housing.

86.5.1 Installation

1. Install a single-gang utility box, or drill two no. 27 (0.144 inch) clearance holes for the reader and one hole for the cable, at the desired mounting height. Observe ADA height requirements.

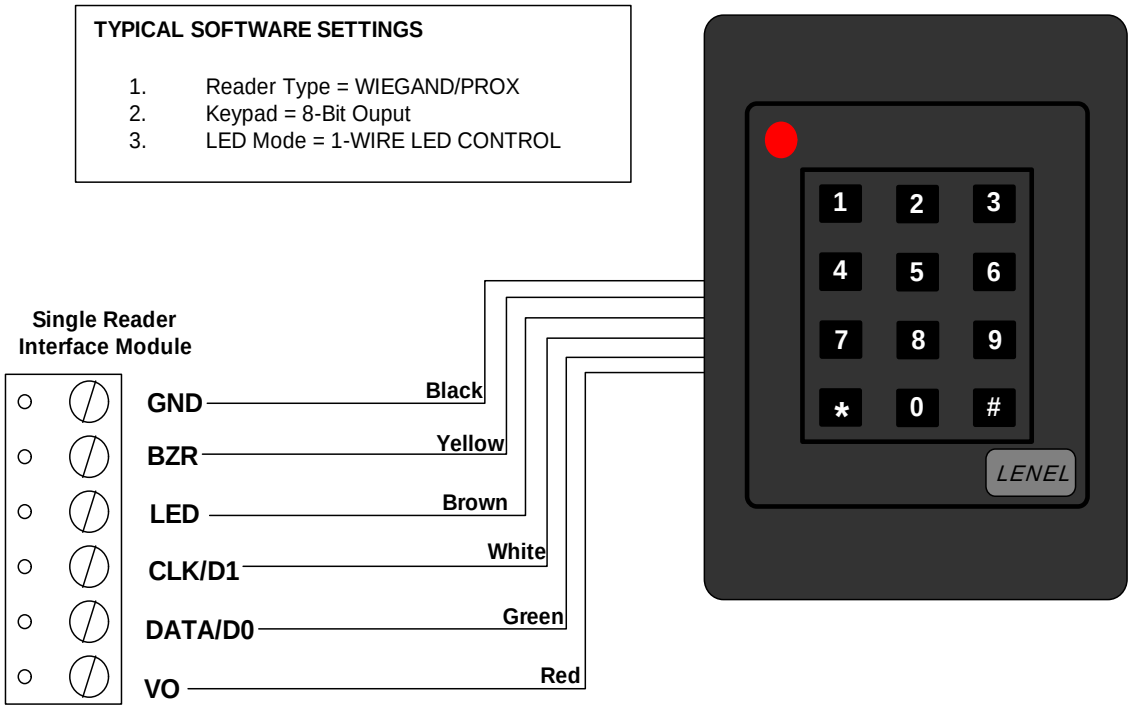
2. Snap open the reader's top cover by inserting a small screwdriver blade into the slot at the bottom edge of the cover, then twisting the blade gently. Do not remove the keypad from the reader.

Snapping open the cover

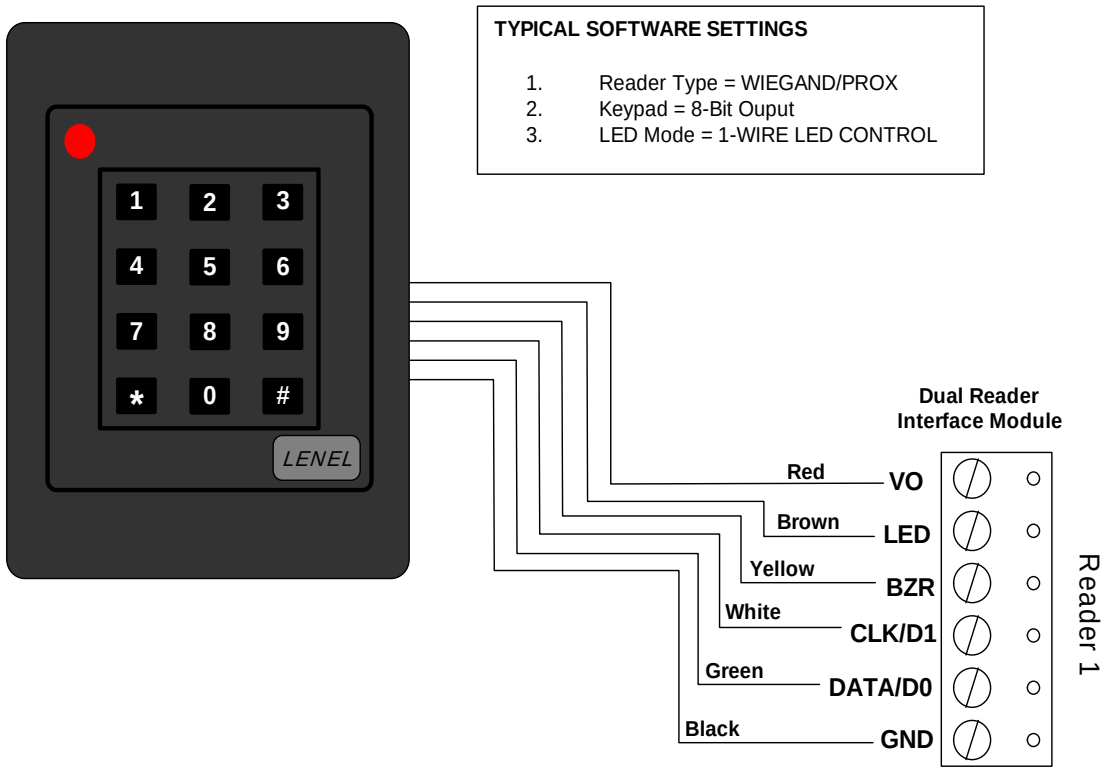


3. Clip off the white in-line connector from the end of the reader's cable. Keep the wires as long as possible.
4. Connect the reader to the access control panel according to the following figure.

Wiring the LPKP-6840/BT-LPKP-NDK and the LNL-1300



Wiring the LPKP-6840/BT-LPKP-NDK and the LNL-1320



- Connect the yellow wire only if used for Beeper control by the panel.
- Connect the blue wire only if used for Hold control by the panel.
- Do not connect the orange and violet wires to anything.
- Tape or cap the unused wires singly.

5. Use a linear regulated power supply, between 5 volts (at least 60 mA) and 12 volts (at least 120 mA).
6. Align the reader with the electrical utility box. Attach the reader to the electrical box with the screws provided.
7. Place the reader's top cover in place and snap the housing closed.
8. Power up the reader. The LED should be steady amber (the beeper does not sound).
9. Present any Lenel proximity credential briefly to the reader. The reader sounds a *Short-Long-Short-Short* sequence. The LED is steady red to indicate standby mode. The reader is now ready for normal operation.
10. The LED color in standby mode may be changed from red to green or from green to red using a color changer card, available from Lenel. Remove power from the reader for a few seconds, then restore power. When the LED is amber, present the color changer card to toggle the LED's standby color.
11. The LED standby mode may be changed from blinking red to steady red, or from steady red to blinking red, using an LED mode changer card, available from Lenel (part # LB-E). Remove power from the reader for a few seconds, then restore power. While the LED is Amber, present the LED mode changer card to toggle the LED standby mode.

Note: In order to use this feature, the reader must be rev. LB. Previous revisions (C8, D, L, LA) of the LenelProx readers do not have this feature and cannot be upgraded.

86.5.2 Operating Modes

The LPKP-6840/BT-LPKP-NDK supports the following operating modes:

- **Prox-plus-PIN.** Present proximity card first, then enter PIN on keypad (default).

- **PIN-plus-Prox.** Enter PIN on keypad first, then present proximity card.

- **Prox-Only.** Present proximity card only. The read cycle is terminated when the controller send out an acknowledgment signal by pulling the LED control line low momentarily. The reader resets and is ready for the next read.

- **PIN-Only.** Enter PIN on keypad only. The read cycle is terminated when the controller sends out an acknowledgment signal by pulling the LED control line low momentarily. The reader resets and is ready for the next PIN entry.

The number of PIN keystrokes required is determined by the host system.

If the host system is programmed for the # command, complete the keypad PIN entry by pressing [#].

86.5.3 Specifications

- Cable to Controller
  - 5 to 7 conductors (not twisted pair), stranded, 22 AWG, color-coded insulation, overall shielded
  - Length: up to 500 feet
- Read Range (metal compensated)
  - 5 VDC: typically 6 inches (15 cm)
  - 12 VDC: typically 8 inches (20 cm)
- Operating Parameters
  - Operating temperature: -35° to 65° C (-31° to 150° F)
  - Operating humidity: 0 to 95% non-condensing
  - Excitation frequency: 125 kHz
  - Wiegand output: 26 to 50 bits (determined by code in credentials)
  - Keypad: 8-bit code from each key
- Certifications
  - UL Listed
  - FCC Part 15
  - Industry Canada
  - RoHS compliant

86.5.4 Notes

1. Power down before any wiring changes. Connect the black wire (ground) first, and the red wire (power) last.

2. When the brown and yellow wires are not used, the LED and beeper remain active, under the readers' internal control.
3. The LED, Beeper, and Hold are logic levels. Never apply power to them They may be pulled to a low level (0 to 1.2 VDC) to enable their function, and float at a high level (3.6 to 5.0 VDC) when not used.
4. The reader has both Wiegand protocol and RS-232 serial interfaces. RS-232 applies to the card reader output only (not to the keypad).
5. FCC Compliance: This equipment has been tested and found to be in compliance with the limits for FCC Part 15, class A digital device. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with instruction manual, may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
   The user are prohibited from making any change or modification to this product. Any modification to this product shall void the user's authority to operate under FCC Part 15 Subpart A Section 15.21 regulations.
   This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
6. Industry Canada Compliance: Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation of the device.

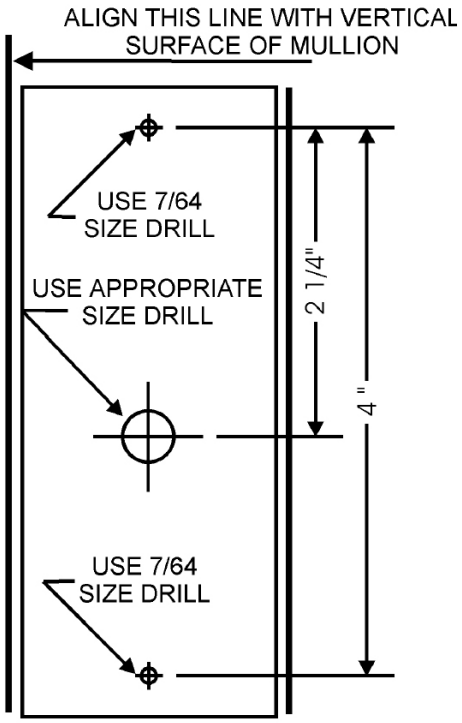
86.6 LenelProx LPSR-2400

The LenelProx LPSR-2400 reader is a radio-frequency proximity reader. The reader consists of a transmit/ receive antenna, reader electronics, in a polycarbonate housing. The housing is potted with epoxy resin to protect the components. The reader may be mounted on a metal door frame or flat surface (wall, housing, etc.).

86.6.1 Installation

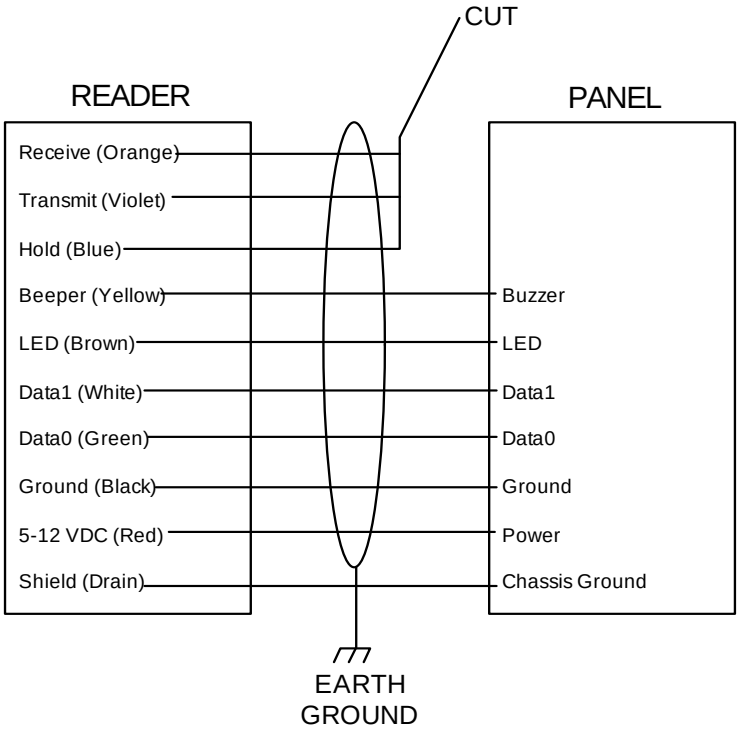
1. Position the reader at the desired mounting height. Observe ADA height requirements. Drill two 7/64 (0.109)-inch holes for the reader, and one clearance hole for the cable.

Holes location for the LPSR-2400



2. Clip off the white connector from the end of the reader's cable. Keep the wires as long as possible.
3. Connect the reader to the access control panel according to the following diagram.
   Connect the yellow wire only if used for Beeper control by the panel.
   Do not connect the orange, blue and violet wires to anything; do not let them touch ground.
   Tape or cap all unused wires singly.

Wiring diagram (Wiegand)



4. Use a linear and regulated power source, between 5 volts (40 mA peak) and 12 volts DC (70 mA peak).
5. Install the reader on the door frame or other surface. Attach the reader to the door frame with supplied screws or with adhesive or sealant.
6. Power up the reader. The LED is steady amber. (The beeper does not sound.)
7. Present any Lenel proximity credential (card, keytag, or wafer) briefly to the reader. The beeper sounds a single short beep. The LED is then steady red to indicate standby mode. The reader is now initialized and prepared to read cards.

Note: All credentials must be Lenel's products.

8. The LED color in standby may be changed from red to green, or from green to red, using a Color Changer card, available from Lenel. Remove power from the reader for a few seconds, then restore power. While the LED is amber, present the Color Changer card to toggle the LED color at standby.
9. The LED standby mode may be changed from blinking red to steady red, or from steady red to blinking red, using an LED Mode Changer card, available from Lenel. Remove power from the reader for a few seconds, then restore power. While the LED is amber, present the LED Mode Changer card to toggle the LED mode at standby.

Note: In order to use this feature, the reader must be rev. LB. Previous revisions (C8, D, L, LA) of the LenelProx readers do not have this feature and cannot be upgraded.

10. When installation is complete, insert screw-hole plugs into the screw clearance holes to conceal the screw heads. Screw-hole plugs are for one-time use. After they are seated, they cannot be removed without damaging the plugs.

86.6.2 Specifications

- Cable to Controller
  - 5 or 6 conductor (not twisted pair), stranded, 22 AWG, color-coded insulation, overall 100% shielded
  - Length: up to 500 feet
- Read Range (metal compensated)
  - 5 VDC: typically 4 inches (10 cm)
  - 12 VDC: typically 5.5 inches (14 cm)
- Operating Parameters
  - Operating temperature: -35° to 65° C (-31° to 150° F)
  - Operating humidity: 0 to 95% non-condensing
  - Excitation frequency: 125 kHz
  - Wiegand output: 26 to 50 bits (determined by code in credentials)

Notes:

When the yellow wire is not used, the beeper remains active and under the reader's internal control.

The Beeper and LED lines are logic levels. Never apply power to them. They may be pulled to a low level (0 to 1.2 VDC) to enable their function, and left floating at a high level (3.6 to 5.0 VDC) when not used.

LPSR-2400 readers have Wiegand-protocol electrical interface only. (There is no RS-232 interface.)

- Certifications
  - UL Listed
  - FCC Part 15
  - Industry Canada
  - RoHS compliant

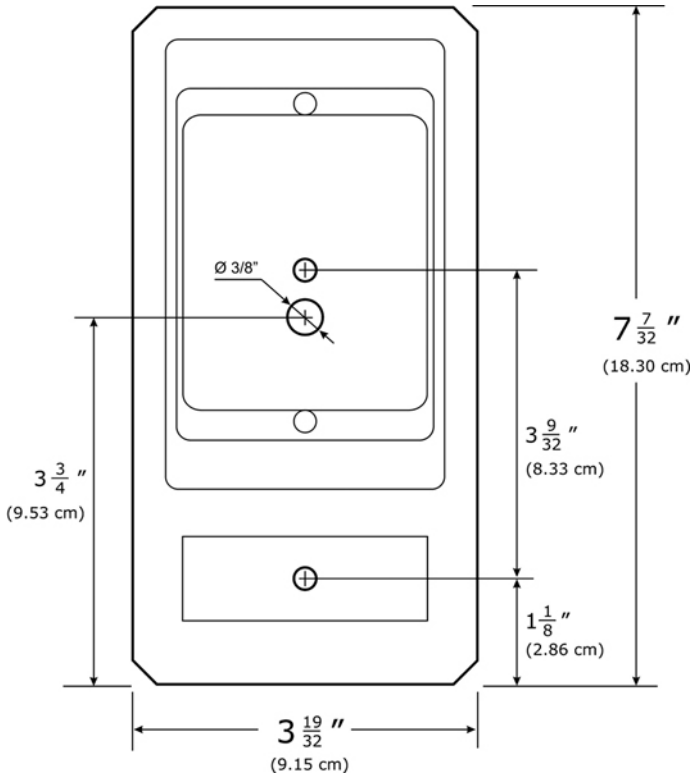
86.7 LenelProx LPRKP-4600

The LenelProx LPRKP-4600 reader is a radio-frequency proximity reader with a virtually indestructible integrated keypad for access control systems. The reader consists of a 12-key piezoelectric keypad, transmit/receive antenna, and reader electronics, in a slim plastic housing. The reader electronics are potted with epoxy resin to protect against the environment. The reader may be mounted on a single-gang electrical utility box, or on any surface (wall, cabinet, etc.).

86.7.1 Installation

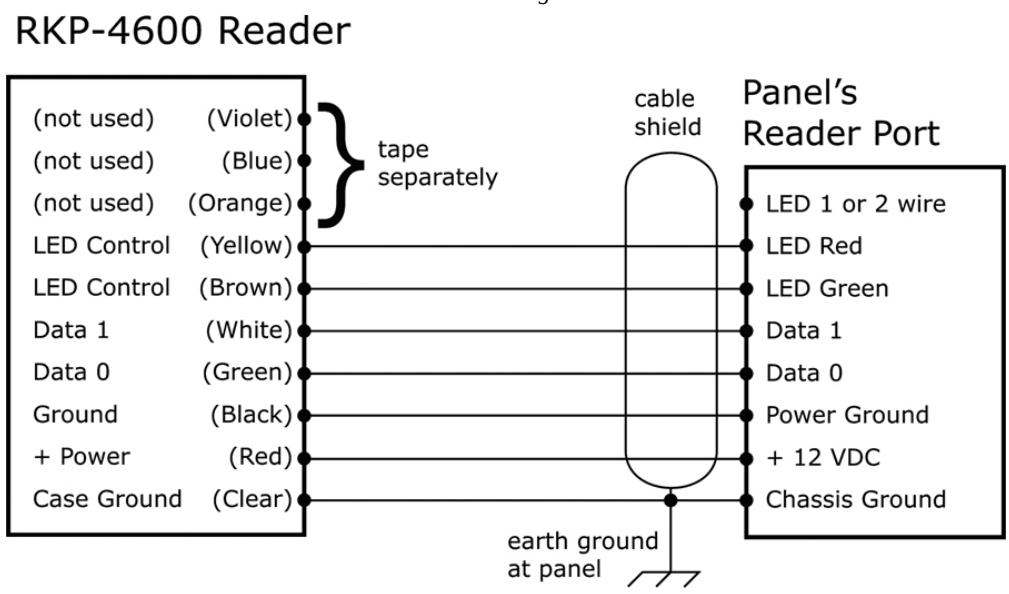
1. Install a single-gang electric utility box, or drill two no. 27 (0.144 inch) clearance holes for the reader's screws and one hole for the cable, at the desired mounting location. Observe ADA height requirements.

Mounting dimensions



2. Place the plastic foam pad behind the reader’s plastic housing. Line up the opening in the plastic foam pad with the opening in the reader's housing where the cables pass through the housing.
3. Pull the reader’s short cable (with the 12-pin connector) through the opening in the housing and out the front of the housing. Pull the long cable (with pigtails) out the back of the housing toward the wall.
4. Wire the reader’s 15-inch-long cable (with gray plastic sheath and 10 pigtails) to the cable from the reader location to the controller panel. The reader's orange wire must be floating - no connection to anything.

Reader wiring



5. Place the reader's plastic housing on the mounting location. Align the two large screw holes in the housing with the holes in the utility box or in the wall. Use appropriate fasteners (supplied). Tighten the screws firmly.
6. Plug the reader's 12-pin female connector, on the short cable, into the 12-pin male connector on the back of the keypad. The connectors' shells are mechanically keyed.
7. Place the keypad on the top of the plastic housing. Use the two no. 6-32 X 5/8" flat-head screws to fasten the keypad to the threaded brass inserts in the plastic housing. Tighten the screws firmly.
8. Use a linear regulated power supply, 12 volts DC +/- 3.0 volts (90 mA peak load). Power may be supplied by the controller panel; connect to the +12 VDC and ground terminals on the reader input port.
9. Power up the reader. There are two sets of LEDs - separate red and green LEDs on the keypad, and a combined red/green/amber LED for the card reader at the bottom of the reader's housing.
10. To start, the keypad's red LED is on, blinking red-off, and the reader's LED is steady amber. (The beeper does not sound.)
11. Present a valid Lenel proximity credential (card, keytag or wafer) briefly to the reader. This initializes the reader. To read a credential, hold it over the indent in the lower-end of the plastic housing. To enter a keystroke, press the marked key firmly. Either action makes an LED change color and a beeper sound.
12. The reader sounds a Short-Long-Short-Short <pause> Long-Short-Short-Short sequence. The reader's LED is blinking-red to indicate Standby mode. The reader is now prepared to read cards.
13. Test the card reader and the keypad on the host system. Then attach the strip label with two small openings over the keypad's LEDs. Attach the other strip label over the keypad's lower screw hole. Attach the larger label over the plastic housing's bottom screw hole; insert this label into the housing's indentation.
14. The reader's LED color in Standby may be changed from red to green, or from green to red, using a Color Changer card, available from Lenel. Remove power from the LPRKP-4600 for a few seconds, then restore power. While the LED is amber, present the Color Changer card to toggle the LED's Standby color.

15. The reader's LED Standby mode may be changed from blinking-red to steady-red, or from steady-red to blinking-red, using an LED Mode Changer card (Lenel part # LB-E). Remove power for the LPRKP-4600 for a few seconds, then restore power. While the LED is amber, present the LED Mode Changer card to toggle the LED's Standby mode.

Operation Modes

LPRKP-4600 Revision LB supports the following operation modes of the host system:

- Prox-plus-PIN. Present proximity card first, then enter PIN on keypad.
- Prox-Only. Present proximity card only.
- Pin-plus-Prox. Enter PIN on keypad first, then present proximity card.
- PIN-Only. Enter PIN on keypad only.

The keypad's red LED blinks once each time that the user presses any key.

The number of PIN keystrokes allowed is determined by the host system (not by the reader).

If the host system is programmed for this command, terminate keypad PIN entry by pressing the # key.

86.7.2 Specifications

- Cable to Controller:
  - 6 conductor (not twisted pair), stranded, 22 AWG, color-coded insulation, overall shielded
  - Length: up to 500 feet
- Read Range (at 12 VDC): typically 4-6 inches (10-15 cm)
- Characteristics:
  - Temperature: -35° to 65°C (-31° to 150°F) operating
  - Humidity: 0 to 95% non-condensing
  - CE Marking
  - UL294 Listed
  - FCC Part 15 certified
- Operating Parameters:
  - Excitation frequency: 125 kHz
  - Wiegand output:
    - Card reader: 26 to 50 bits (determined by code in credentials)
    - Keypad: 8-bit code for each keystroke

Notes: Two readers at the same door may need to be separated physically or shielded from each other for best operation.

The beeper has no external control. The beeper operates under the reader's internal control.

The LED lines are at TTL logic levels. Never apply power to them. They may be pulled to low level (0 to 1.2 VDC) to enable their function, and float at high level (3.6 to 5.0 VDC) when not used.

FCC Compliance: This equipment has been tested and found to be in compliance with the limits for FCC Part 15, Class A digital device. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with instruction manual, may cause harmful interference

with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The users are prohibited from making any change or modification to this product. Any modification to this product shall void the user's authority to operate under FCC Part 15 Subpart A Section 15.21 regulations.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Compliance: Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

- Certifications
  - UL Listed
  - FCC Part 15
  - Industry Canada
  - RoHS compliant

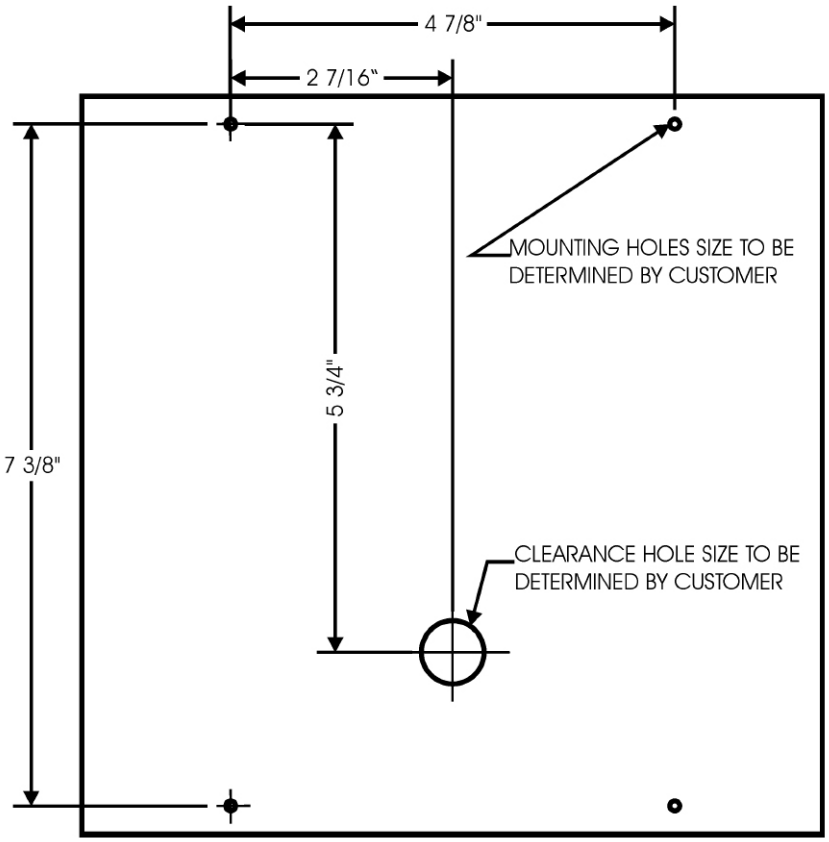
86.8 LenelProx LPMR-1824 and LPMR-1824 MC

The LenelProx LPMR-1824 reader is a medium-range radio-frequency proximity reader for gate control and access control systems. The reader consists of a transmit/receive antenna, associated electronics, and a poly carbonate housing that encloses the antenna and electronics. The housing is potted with epoxy to protect the components. The reader may be mounted on a flat surface (wall, plate or housing). “MC” designates the metal-compensated version of this reader that must be mounted on a metal surface larger than the reader.

86.8.1 Installation

1. Position the reader at the desired mounting position. Observe ADA height requirements, if applicable. Drill four holes for the screws or anchors, and one clearance hole for the cable. The installer determines the size of mounting holes and cable clearance hole.

Holes location



Notes:

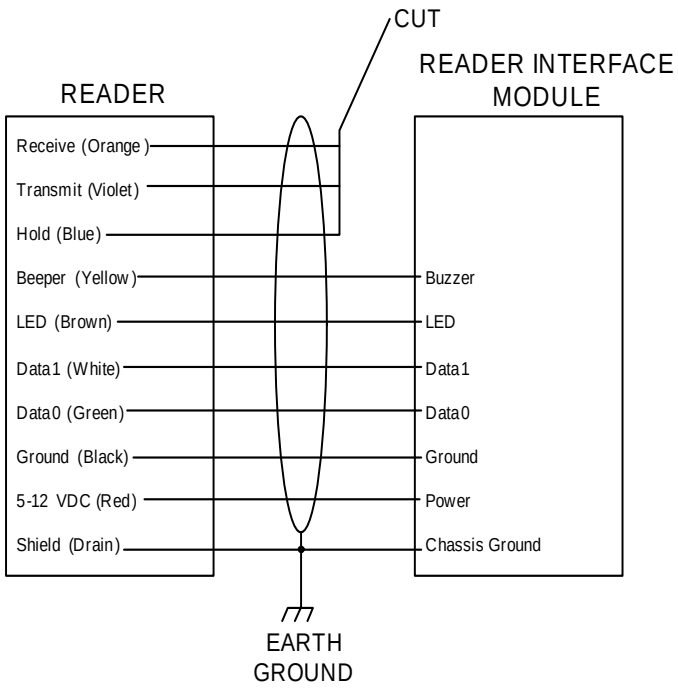
Use the LPMR-1824 MC, the metal-compensated form of the LPMR-1824 reader only when nearby metal will reduce the performance of the standard LPMR-1824 reader.

When using the LPMR-1824 MC reader, it should be mounted on a metal surface that is larger than the 8 x 8 inch reader housing. Lenel recommends a metal surface of 12 square inches or larger.

2. If you are installing the LPMR-1824, SKIP THIS STEP and proceed to step 3!
   To mount the LPMR-1824 MC reader on the metal surface:
   a. Remove the four screws through the front of the reader's plastic housing. This releases the four ferrite tiles from the back of the reader.
   b. Use the ferrite tiles as templates for mounting holes on the wall or other surface. These holes are at the center of each 4 x 4-inch tile. The center of the hole is two inches from each edge.
   c. If necessary, enlarge the hole in the ferrite tiles slightly by drilling or reaming.
   d. Screw the reader's plastic base and the ferrite tiles to the wall by inserting the 4 screws first through the inside of the plastic base, then through the holes in the ferrite tiles, then into the mounting holes in the wall.
   e. Reattach the reader's plastic cover using the screws that were removed in step a.
3. Clip off the white in-line connector from the end of the reader's cable. Keep the wires as long as possible.

4. Connect the reader to the controller panel according to the following figure.

Wiring diagram (Wiegand)



Connect the yellow wire only if used for Beeper control by the panel.
Connect the blue wire only if used for Hold control by the panel.
Do not connect the orange and violet wires to anything. Tape or cap the unused wires singly.

5. Use a Lenel regulated power supply with linear output, between 5 volts (250 mA) and 12 volts DC maximum (600 mA peak). Do not power the LPMR-1824 from the panel's reader input port. Tie the ground side of all DC power supplies together – including the reader, the panel's input port, and the door/gate release.
6. To install the reader's cable through the surface directly behind the reader, insert both cable slot plugs in the sides of the reader's top cover. To run the cable exiting from the side of the reader, press-fit the cable into the curved channel and guide the cable out of the desired side of the reader. Then insert the cable slot plug in the other side of the top cover.
7. Install the reader on the mounting surface, using screws and anchors as necessary.
8. Power up the reader. The LED is steady amber. (The beeper does not sound.)
9. Present any valid Lenel proximity credential (card, key tag or wafer) briefly to the reader. The beeper sounds a single short beep. The LED is steady red to indicate standby mode. The reader is initialized and prepared to read cards.

Note: All credentials must be Lenel's own products.

10. The LED color in standby mode may be changed from red to green, or from green to red, using a Color Changer card, available from Lenel. Remove power from the reader for a few seconds, then restore power. While the LED is amber, present the Color Changer card to toggle the LED color at standby.

11. The LED standby mode may be changed from blinking red to steady red, or from steady red to blinking red, using an LED Mode Changer card, available from Lenel (part # LB-E). Remove power from the reader for a few seconds, then restore power. While the LED is Amber, present the LED Mode Changer card to toggle the LED mode at standby.

> **Note:** In order to use this feature, the reader must be rev. LB. Previous revisions (C8, D, L, LA) of the LenelProx readers do not have this feature and cannot be upgraded.

12. When installation is complete, insert screw-hole plugs into the screw clearance holes to conceal the screw heads.
    Screw-hole plugs are for one-time use. After they are seated, they cannot be removed without damaging the plugs.

86.8.2 Maximum Read Range

Following the listed recommendations will assure that LenelProx LPMR-1824 readers perform at the published read range rating (18-24 inches).

Wiring

- The reader cable may be 6 conductor, 22 gauge, up to 500 feet long. It MUST be high quality, overall-shielded. It does not have to be twisted pair.
- If the cable is twisted pair, assign the connections to avoid data crosstalk - pair one of the data lines (say, D0) with the power hot wire in one twisted pair. The reader’s paired wire colors will then be green with red, and white with black.

Power Supply - Voltage

- Use a REGULATED DC power supply with LINEAR output current. Do not use a switching power supply.
- Use a power supply that delivers not more than 12.0 volts DC at the reader's power connections. (The applied voltage at the reader may be as low as 5 VDC, but this may reduce the read range by about 25%.)
- Connect power common (ground) to the black wire in the reader's cable, and connect positive power to the red wire.

Power Supply - Current

- Do not draw reader power from the host controller's internal power source, such as the reader input port, unless it meets all of the requirements above, and its current rating is sufficient for the peak power requirement of the LPMR-1824 (600 mA at 12 VDC, or 250 mA at 5 VDC).
- Use a DC millimeter in series with the reader power supply to measure the current capacity.
- If using an external power supply, Lenel recommends its PS12-1A DC Power Supply, which has excess power for 1 MR-1824 reader.

Distance from Metal

- Mount the MR-1824 reader on a non-metallic surface. Metal sheets, screens, plates, studs, posts, structural members, etc. should be about one foot away from the reader, in all directions.

- If there is metal behind the MR-1824 reader, such as the mounting plate on a gooseneck post or pedestal, use a non-metallic housing for easy installation and wiring. Or use plaster or plastic or wood spacers for at least 4 inches between reader and metal.
- Do not mount the reader inside a metal housing, enclosure or room. Do not recess the reader in an opening in a metal surface.

Metal Compensation

- If the reader must be mounted on metal, use the LPMR-1824 MC metal-compensated version.
- The LPMR-1824 MC reader must be installed on a metal sheet or plate that is larger than the 8 x 8 inch reader case. A plate that is 12 inches square to 24 inches square is effective.
- If the metal-compensated LPMR-1824 MC reader is used, the plastic housing or spacers are not necessary.
- The effective read range of the metal-compensated MR-1824 MC, with the Lenel cards, is approximately 16 inches due to the compensation factors.

Distance between Readers

- Multiple LPMR-1824 readers should be at least 8 feet apart.
- If LPMR-1824 readers must be closer together than 8 feet, place metal sheet, foil or screen between them, to isolate their fields.
- If the installation combines an MR-1824 with other proximity readers having shorter read range than LPMR-1824, the distance between these readers can be less than 8 feet.
- Connect just one reader to the terminals of each reader-input port on the host controller or panel.

Credentials

- Use only Lenel’s 125 kHz proximity cards, key tags and wafers. (Cards or tags from another manufacturer will not be read by Lenel’s proximity readers.)
- For best read range, use Lenel’s Prox-Linc CS clamshell cards. For rated read range, use GR or GRMAG cards. KT key tags have read range that is about 75% of the GR cards' range. PW proximity wafers have read range that is about 40% of the GR cards' range.

Environment

- LPMR-1824 readers may be mounted where they are exposed to weather (but observe Lenel’s specifications for operating temperature and humidity, in the MR-1824 data sheet).
- Keep computer monitors several feet away from the LPMR-1824 reader.
- Mount the LPMR-1824 reader in an electrically quiet environment. Avoid heavy electrical machinery.
- Stay away from RF fields, like radio transmission antennas and microwave.

Field Test

1. Carry the MR-1824 reader to a remote outdoor area not subject to electrical noise and RF fields.
2. Power the reader with a fully charged battery, 12 volts, 7 ampere-hours or larger.
3. Connect only the 2 power wires - black to ground, and red to +12V.

4. Present a Lenel card to the reader. The LED will change from red to amber for about 1 second, then back to steady red when the card is removed.
5. Experiment with the maximum distance from the reader at which the card reads. Record the test results.
6. If the reader fails to meet Lenel's specifications, contact Lenel's Technical Support.

Site Test

Interchange two MR-1824 readers - Does the problem stay at the location or move with the reader?

86.8.3 Specifications

- Mounting Surface
  - LPMR-1824: Non-metallic material only (Keep reader at least 3 inches from all metal)
  - LPMR-1824 MC: Metallic material only (Metal plate, sheet or housing with surface at least 12 square inches; reader centered in area)
- Cable to Controller
  - 5 to 7 conductors (not twisted pairs), stranded, 22 AWG, color-coded insulation, overall 100% shielded (Number of conductors depends upon use of optional features - Beeper, Hold and LED.)
  - Length: up to 500 feet
- Read Range
  - LPMR-1824:
    - 5 VDC: typically 12 inches (30 cm)
    - 12 VDC: typically 18 to 24 inches (45 to 60 cm)
  - LPMR-1824-MC:
    - 5 VDC: typically 8 inches (20 cm)
    - 12 VDC: typically up to 16 (40 cm)
- Operating Parameters
  - Operating temperature: -35° to 65° C (-31° to 150° F)
  - Operating humidity: 0 to 95% non-condensing
  - Excitation frequency: 125 kHz
  - Wiegand output: 26 to 50 bits (determined by code in credentials)
- Certifications
  - UL Listed
  - FCC Part 15
  - Industry Canada
  - RoHS compliant

Notes:

The Beeper sounds as described without connecting the yellow wire to the controller.

Beeper, Hold, and LED lines are logic levels. Never apply power to them. They may be pulled to a low level (0 to 1.2 VDC) to enable their function, and left floating at a high level (3.6 to 5.0 VDC) when not used.

Use the LPMR-1824-MC (the metal-compensated form of the LPMR-1824) only when nearby metal will reduce the performance of the standard LPMR-1824 reader.

When using the LPMR-1824-MC reader, it should be mounted on a metal surface that is larger than the 8 x 8 inch reader housing. Lenel recommends a metal surface 12 square inches or larger.

LPMR-1824 and LPMR-1824 MC readers have both Wiegand and RS-232 interfaces.

86.9 LenelProx LPLR-911

The LPLR-911 reader is a long-range (9 to 11 feet) reader that works with paper-thin passive windshield-mounting tags or surface-mounting tags. This reader comes with a unique combination of long read range, small size, and low power consumption. The LPLR-911 has an internal power converter, allowing it to work with a wide range of supply inputs without affecting its performance. With a 12 VDC supply, its current consumption is less than 450 mA, making it possible to be powered directly from the supply in the access control panel, thereby eliminating the need for an external supply. LPLR-911 has simultaneous Wiegand and RS-232 outputs. Its primary applications are automated parking garage entrance control, hands-free access control, asset tracking, and asset management applications.

86.9.1 Preparing for Installation

Always conduct a site survey before starting installation. Avoid any possible sources of interference. If the reader is not installed properly, the performance will be degraded or more seriously the reader may be damaged. The following is a list of installation procedures that should be followed during installation:

- Do not install the reader in an area where sources of broadband noise may exist. Avoid mounting the reader facing a cellular phone tower or in close proximity to the base station of a 900 MHz wireless telephone.
- Keep all of the reader wiring at least 12 inches (30 cm) away from all other wiring, including, but not limited to, AC power, computer data wiring, telephone wiring, and wiring to electrical locking devices.
- Do not operate the reader in close proximity to any 900 MHz wireless equipment.
- Avoid mounting the reader under direct sun light. Sun light in some locations may cause the reader to operate at a temperature above the 65 degrees Celsius upper limit.
- Make sure that the supply voltage of the reader is within specification.
- Use cables with over-all shield (screen).
- For best results, run the cable in an individual conduit with at least 12 inches distance from the AC power, computer data cables and cables for electrical locking devices.
- Use recommended cable. Do not use any unshielded “Twisted Pair” type cable.
- Use the largest wire gauge possible.
- Use dedicated power supply, where necessary.

- Use Single Point Grounding (Earthing). No ground loops.

The LPLR-911 has a uni-directional antenna with an antenna beam width of about 60-70 degrees. The radiation pattern is an oval-shaped beam, which should be aimed toward where the transponders will pass. For best results, the antenna should be mounted on a post, about 6 to 7 feet above pavement, with the antenna angled slightly downward toward a vehicle passing through the drive lane. The 11 foot tip of the antenna radiation pattern should reach the windshield directly in front of the passenger or driver. Install readers for neighboring vehicle lanes so that the effective areas for detecting tags do not intersect. Only one reader should be able to read a tag at any location of the tag. Be sure to elevate the antenna slightly to accommodate sport utility vehicles, minivans and trucks.

Note: An additional installation kit (part number LPLRIN) is required for the LPLR-911.

Wiring Requirements

All the reader wiring must be continuously shielded. Use 22 AWG up to 18 AWG, six or seven-conductor shielded cables. Longer distances and higher current consumption on the power supply line will require larger gauge wires. Due to system data termination differences, contact your panel manufacturer for the proper wire sizes to meet the specific requirements.

Power Supply

For consistent performance, choose a high-efficiency switching power supply with remote sense and use the voltage sense wire to ensure consistent performance. Alternatively, use a linear, regulated power supply with sufficient current capacity.

Grounding

Grounding is critical for proper operation of a system with LPLR-911 readers. When installing the controllers, it is crucial to assure that the earth ground is the best ground available. If you elect to use the 120 VAC power ground, conduct a test by measuring its resistance relative to a known good ground, such as a cold water pipe or structural steel that is in direct contact with the ground. The resistance should be less than 50 ohms. If you find that the AC power line does not provide adequate earth ground, try using a solid connection to a cold water pipe.

For multiple controller installations, it is critical that all panels are connected to the same grounding system. Using different grounding systems will create secondary current paths or ground loops that can affect the performance and cause damage to the readers.

The Shield (Drain) wire of the reader cable should be connected to the shield of the extender cable between the reader and the panel. If there is no extender cable, the reader's Shield (Drain) wire should be connected to nothing. Do not connect the extender cable's shield to ground at either end – not at the reader and not at the panel.

Measuring Reader Distance

The WS transponder for this reader is designed for windshield mounting. To measure the read range between the reader and the transponder, the transponder must be placed behind a piece of glass about 0.25 inches thick and the transponder must be flat against the glass. Grasp the transponder by the edges and hold the transponder so that the copper circuit faces the reader. Move the transponder toward the reader, with the card surface parallel to the reader, until a BEEP occurs (using the SP-6820-LR test unit). The BEEP indicates that

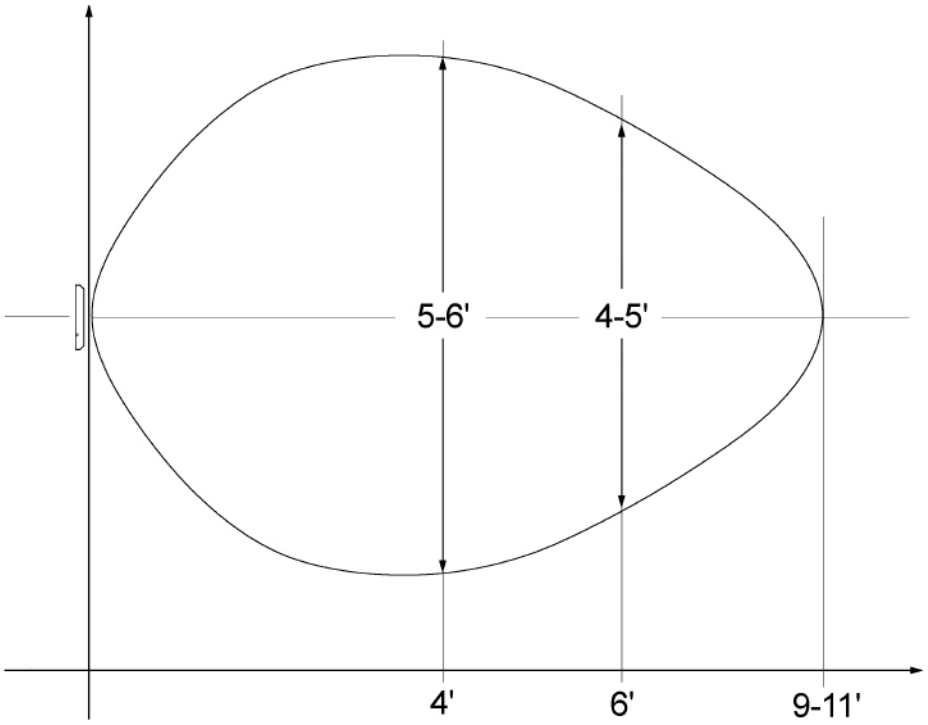
the reader detects and reads the transponder. Optional firmware allows the user to select read repetition rates of about 3 per second, 1 per second, or 1 per 3 seconds.

Important: FAILURE TO FOLLOW THE INSTALLATION GUIDE MAY RESULT IN POOR PERFORMANCE OR EVEN CAUSE PERMANENT DAMAGE TO THE READER, THUS VOIDS THE PRODUCT WARRANTY.

86.9.2 Installation

1. Locate the reader at the desired mounting position on a mounting post or a mounting surface. For mounting on a flat surface, drill four small holes through the aluminum plate behind the reader housing for mounting screws, and one clearance hole for the reader cable. For flexible mounting, use a video camera adjustable mount or clamps. The installer determines the size of the mounting holes and the clearance hole. Consider the following:
   - Metal plate: The reader is equipped with an aluminum plate attached on the back surface, which provides a flange that may be used as desired to install the reader. The flange may be drilled for screw holes, or may be clamped to an adjustable bracket. Do not remove this plate.
   - Reader orientation: The reader may be mounted in any orientation – at any angle.
   - Mounting material: The surface or the device that supports the reader may be any material, including metal.
   - Environment: There must be no material between the reader and the tag (except for the windshield glass when using the WS tag). Avoid strong RF fields, such as nearby radio transmitters. Avoid HVAC motors with improper shielding.
   - Multiple readers: Maintain at least 12-foot spacing between adjacent readers. Aim the readers so that the fields from adjacent readers are parallel (not overlapping within the read range). This will prevent a given tag from being detected by two readers simultaneously.
   - Mapping a reader's field: The field in which a long-range tag can be detected is a circular oval emitted from the front of the reader. The oval's apex is at the center of the reader. Maximum read range occurs close to the axis of the cone.

Width and height of surveillance zone with WS tag



2. Install the tags on the selected surface, for example, inside vehicle windshields or on the side of bins, pallets, truck trailers, etc. The tags must be firmly attached on the inside of vehicle windshield glass, to assure rated read range. Do not use plastic pouches, attach to window glass, hold by hand, or place on dashboard. There are two types of tags that can be used: WS tags and MT tags.
   - For WS tags:
     a. Selecting the location for WS tags: Choose a location on the vehicles' windshields where there is minimal or no tinting, and no embedded wires for defrosting or radio antenna. The location should be closest to the LPLR-911 reader and "facing" the reader, that is, with the surface of the tag parallel to the front surface of the reader.
     b. Preparing a tag: Clean the inside of the windshield where the tag will be applied. Carefully peel off the front of the tag (the unprinted side), exposing the adhesive and the copper circuit.
     c. Applying the tag: Press the adhesive side of the tag on the inside of the windshield. Rub the tag so that it is tightly attached to the glass, as flat as possible, without wrinkles. This is a onetime application – the tag can not be removed from the glass and re-applied.
     d. Caution: Any metal content in or on the windshield can severely limit the reader's capability.
   - For MT tags,
     a. Selecting the location for MT tags: Choose a flat surface large enough for the entire tag to be supported. The material of this surface may be metal or other material. The tag should not be subject to mechanical damage. The location should be closest to the LPLR-911 reader and "facing" the reader, that is, with the surface of the tag parallel to the front surface of the reader.
     b. Preparing a tag: Clean the surface where the tag will be applied. Carefully peel off the pink paper from the back of the tag, exposing the adhesive.

c. Applying the tag: Press the adhesive side of the tag to the mounting surface. Rub the tag lightly so that it is tightly attached to the surface, as flat as possible. This is a one-time application – the tag can not be removed from the surface and re-applied.

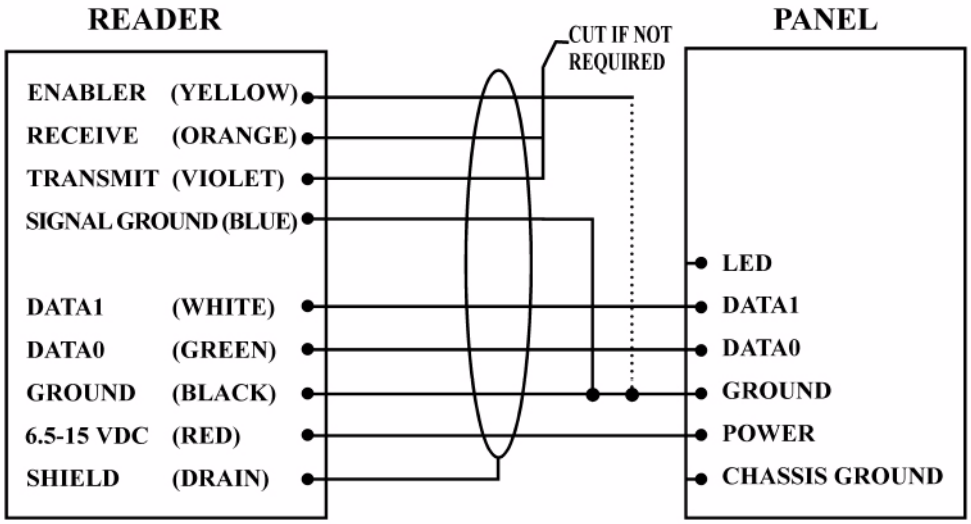
d. Securing the tag: When MT tags are installed outdoors, add a bead of silicone adhesive around the entire perimeter of the tag. This adds to the adhesion and excludes moisture.

3. Use the Installation Kit to provide audible and visible feedback as the tags are attached and the reader is aimed at the tags.

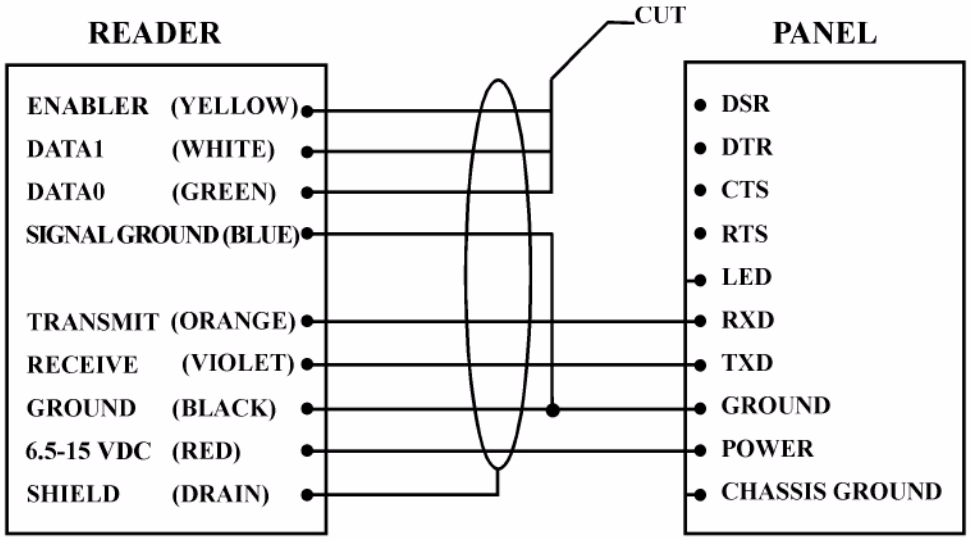
4. For Wiegand or RS-232 outputs, see the following wiring diagrams.

- Reader cable: Use high-quality cable, 6 conductors, 22 gauge, stranded, color-coded insulation, overall-shielded. Maximum cable length from the reader to the host controller is – For Wiegand interface, 500 feet. For RS-232 serial interface, 50 feet.
- Electric power: Voltage may be between +6.5 VDC and +15 VDC, regulated, either linear or switched. Power rating must be sufficient to supply 1.0 ampere at 6.5 volts, 0.5 ampere at 12 volts, or 0.4 ampere at 15 volts.
- Data connection: The LPLR-911 reader has wires for both Wiegand and RS-232 interfaces, with simultaneous output. For Wiegand Interface, the data format is the same as the bit format used in programming the tags (between 26 bits and 56 bits). For RS-232 interface, connect the reader's Receive line (violet) to the TXD terminal, and the reader's Transmit line (orange) to the RXD terminal.

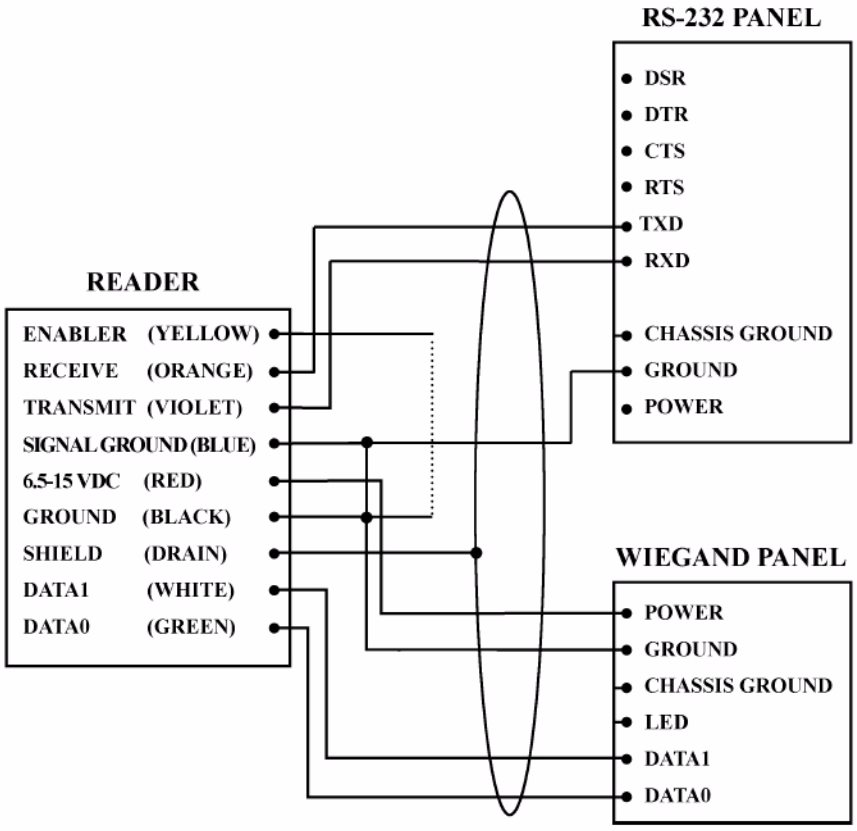
Wiring diagram for Wiegand output format



Wiring diagram for RS-232 output format



Wiring diagram for RS-232 & Wiegand output format



5. Complete the following steps for verification.

a. Connect the LPSP-6820-LR test unit, which is part of the Installation Kit, to the reader cable. Use the wiring list in the Installation Instructions. Apply power to the reader and the test unit, using the plug-in DC power module in the Installation Kit.

b. Use either a WS tag that is attached firmly by its adhesive to a rectangle of windshield glass, or a MT tag for verification. Hold the tag so that the hand does not interfere with direct line-of-sight between the tag and the reader.

c. Move the tag into the field. Observing the LPSP-6820-LR test unit, there is a brief LED color change and a beep to indicate each read of the tag by the reader. Reads will repeat at a rate that is determined by the reader's firmware.

d. Move the tag from side to side, and at varying distances from the front of the reader housing, to determine the space in which the tag and reader are active.

6. Mount the reader.

a. Check to ensure that all connections are secure. Feed all wires through the cable access hole to the rear or the side of the mounting position.

b. Mount the reader using fasteners on the aluminum plate to which the LPLR-911 reader is attached. Drill holes through the plate as required by the application, or attach flexible mounting devices or clamps.

c. Adjust the position or the angle of the reader so that the tags (which have been fastened by adhesive to the windshield or other surface) are detected and read at the desired distance from the reader.

86.9.3 LPLRIN Installation Kit

The installation kit consists of the following components:

- one LPSP-6820-LR test unit with LED and beeper, and cable with three spring-clips
- one LPWS tag, mounted on a windshield glass square
- one LPMT tag
- one LPPS12-1A power supply for LPLR-911 with cable and two spring-clips
- one RS-232 adapter cable with 9-pin "D" serial connector, and cable with three spring-clips

The LPSP-6820-LR test unit is connected to the LPLR-911 reader only during test and alignment of the reader. It has a red-green LED and a buzzer, providing visible and audible feedback to the installer every time that the tag is read.

Use the tag that is attached to the windshield glass sample to test the installation. The glass must be in between the reader and the tag. Be sure that the fingers and the hand do not come between the reader and the tag.

Hold the glass with the LPWS tag in the approximate position where tags will be mounted inside the vehicles' windshields. Adjust the reader on its adjustable mounting until the LED and beeper indicate repeated reading (at a rate of about three per second).

86.9.4 Specifications

- Cable to Controller: 9 conductor stranded, 22 AWG, with continuous shield for typical installation
- Read Range: 9-11 feet (2.75-3.35 meters)
- Weight: 37.5 oz.
- Operating Parameters:

  - Operating temperature: -35° to 65°C (-31° to 150°F)
  - Operating humidity: 0 to 95% non-condensing
  - Transmitting frequency: 902 to 928 MHz
  - Voltage: 6.5 VDC to 15 VDC
  - Current requirement: 1.0 A to 0.4 A
  - Output format: Wiegand and RS-232
- Certifications
  - UL Listed
  - FCC Part 15
  - Industry Canada
  - RoHS compliant

LENEL KEYPADS

87 Lenel Keypads

These keypads are available in two styles: 3 x 4 keypads (part number LNL834S121NN) and 2 x 6 keypads (part number LNL826S121NN).

87.1 LNL826S121NN 8-bit Output Keypad Reader

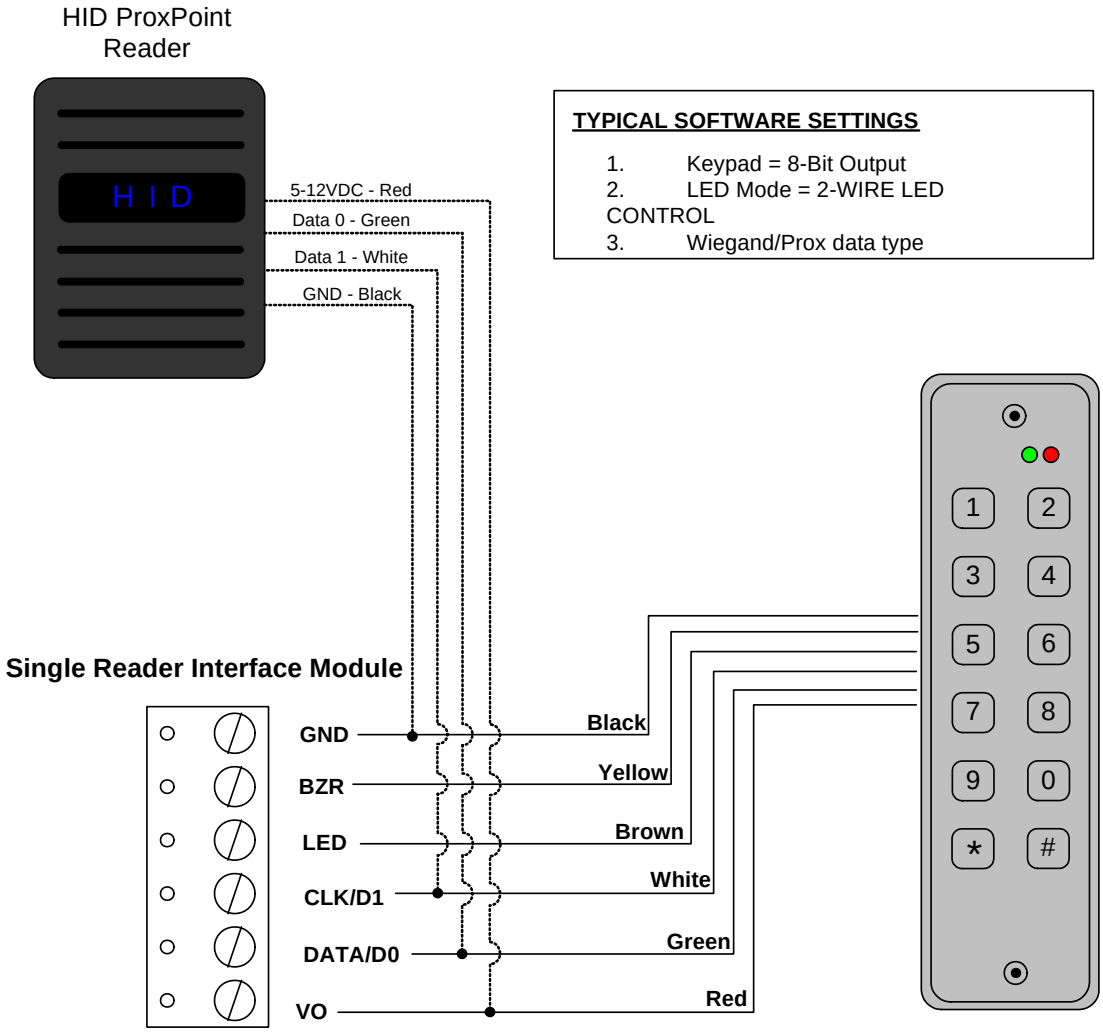
The reader requires a 12-28 VDC power source and has a current draw of 30 mA. Therefore, the reader can be powered directly from either of the reader interface modules.

The wiring diagrams describe wiring if the keypad is being connected in line with another Lenel supported reader and the LED support for the keypad is being used. The keypad features a 2-Wire LED configuration. If the LED support for this keypad is not being used, omit the connections for those two wires. The reader is using a standard 8-bit output format.

Important: Make sure that the LED control is connected for only one reader. Both reader LEDs can not be connected at the same time.

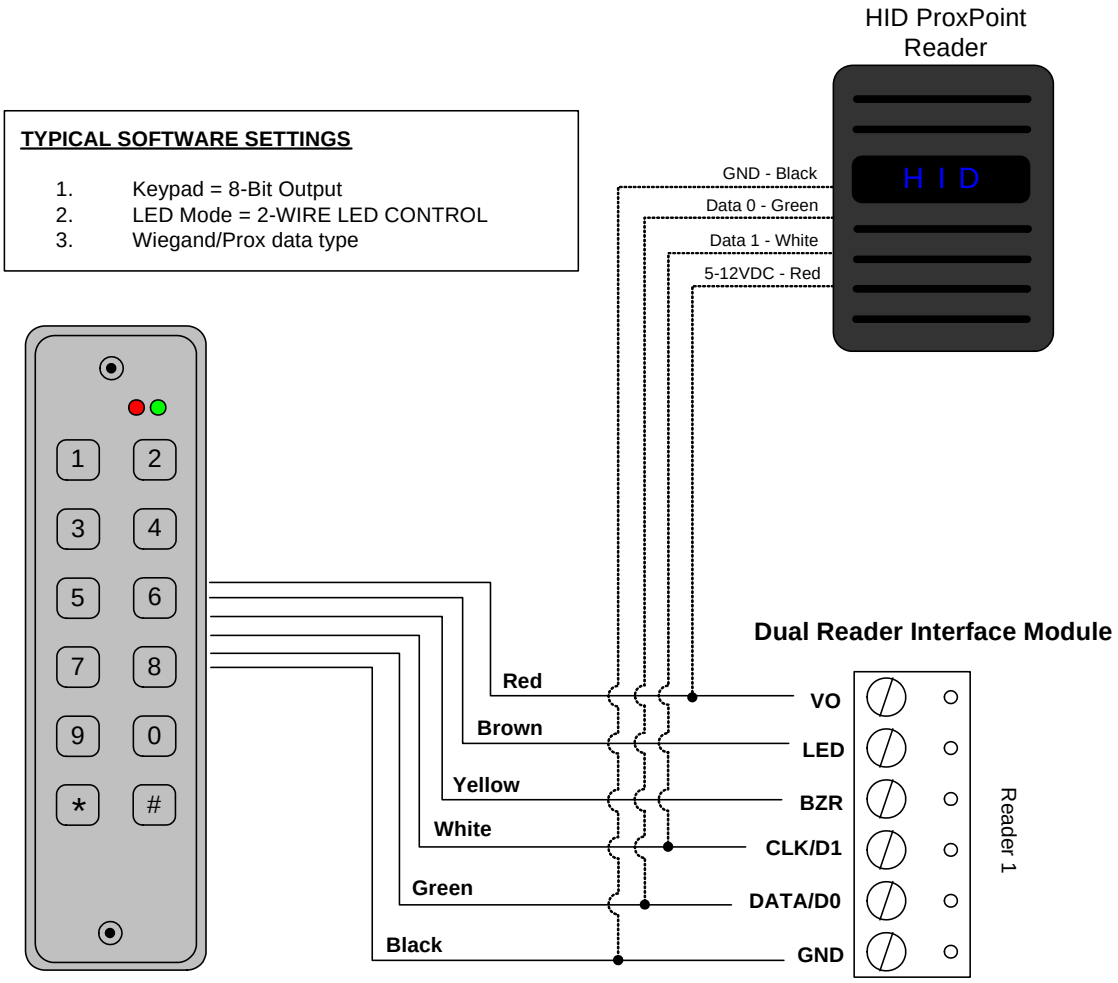
87.1.1 Wiring the LNL-1300

The wiring diagram has the 2 x 6 keypad depicted. A 3 x 4 keypad may also be used.



87.1.2 Wiring the LNL-1320

The wiring diagram has the 2 x 6 keypad depicted. A 3 x 4 keypad may also be used.



87.2 Reader Specifications

- Protocol: 8 bit word output
- Power: 12 to 28 VDC
- Current: 30 mA
- Environment: IP68; 100% relative humidity
- Temperature: -40° to 158° F (-40° to +70° C)
- Brushed aluminum construction; other colors available optionally

LENEL OPENCARD READERS

88 Lenel OpenCard Readers

Use the following diagrams to wire (single wire LED control) Single/Dual Reader Interface Modules and OpenCard readers.

88.1 OpenCard ISO-X Readers

The ISO-X reader model LNL-XF1100D (mullion mount) operates at 6-16 VDC with an average current draw of 95mA.

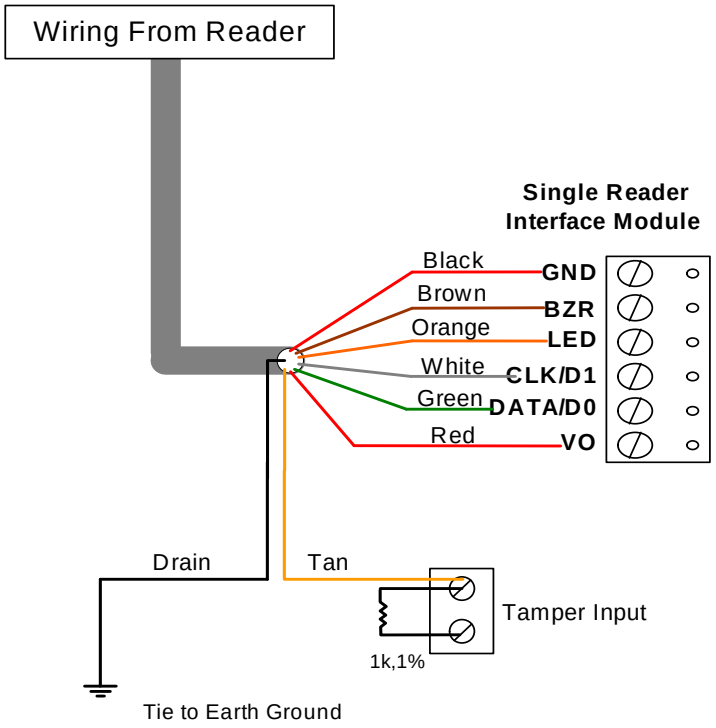
Model LNL-XF2100D (wall mount) operates at 8-16 VDC with an average current draw of 95mA.

Model LNL-XF2110D (wall mount) has a keypad and operates at 8-16 VDC with an average current draw of 120 mA.

Model LNL-XF1050K (mini-mullion) operates at 5-16 VDC.

Standards and Technologies Supported	Compatibility
125 kHz Proximity	
GE CASI ProxLite®	Supported
HID® Proximity	Supported
XceedID™	Supported
ISO 15693 13.56 MHz Vicinity	
XceedID ISO-X™ Secure Sector	Supported
Infineon my-d® Secure Sector	Supported
HID iCLASS® Serial Number	Supported
Infineon my-d® Serial Number	Supported
Inside Contactless PicoTag® Serial Number	Supported
ST Microelectronics® Serial Number	Supported
Texas Instruments Tag-It® Serial Number	Supported
Philips I-Code® Serial Number	Supported
ISO 14443 13.56 MHz Proximity	
XceedID ISO-X™ Secure Sector	Supported
Infineon my-d® Secure Sector	Supported
DESFire® Serial Number	Supported
DESFire® Sector	Q4 2005
MIFARE® Serial Number	Supported
MIFARE® Sectors	Q4 2005

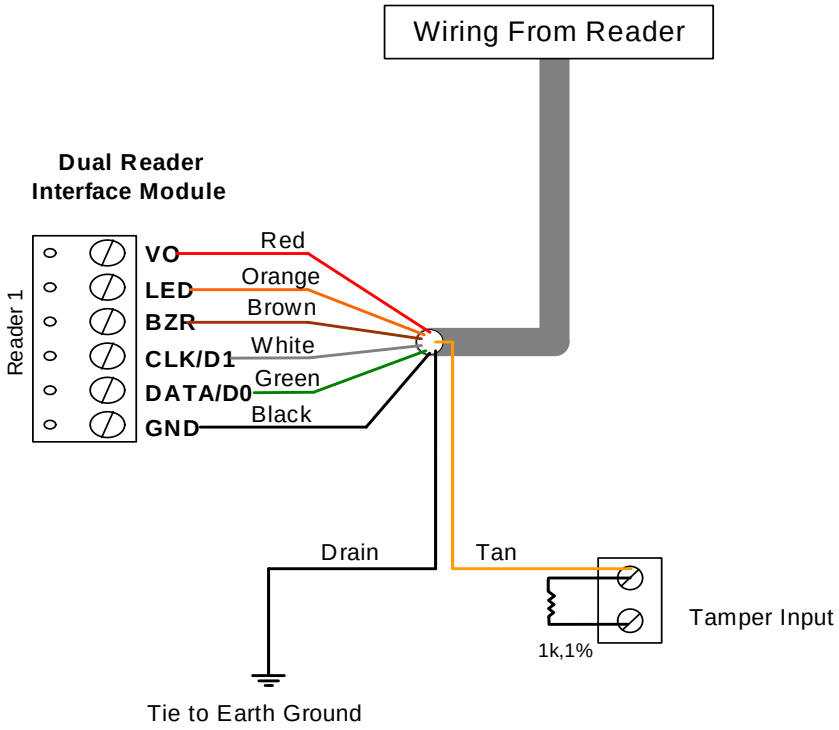
88.1.1 Wiring the LNL-1300



TYPICAL SOFTWARE SETTINGS

1. Reader Type = WIEGAND/PROX
2. Keypad = No Keypad/8-bit Output Keypad on XF 2110 Only
3. LED Mode = 2-WIRE LED CONTROL

88.1.2 Wiring the LNL-1320



TYPICAL SOFTWARE SETTINGS

1. Reader Type = WIEGAND/PROX
2. Keypad = No Keypad/8-bit Output Keypad on XF2110 Only
3. LED Mode = 2-WIRE LED CONTROL

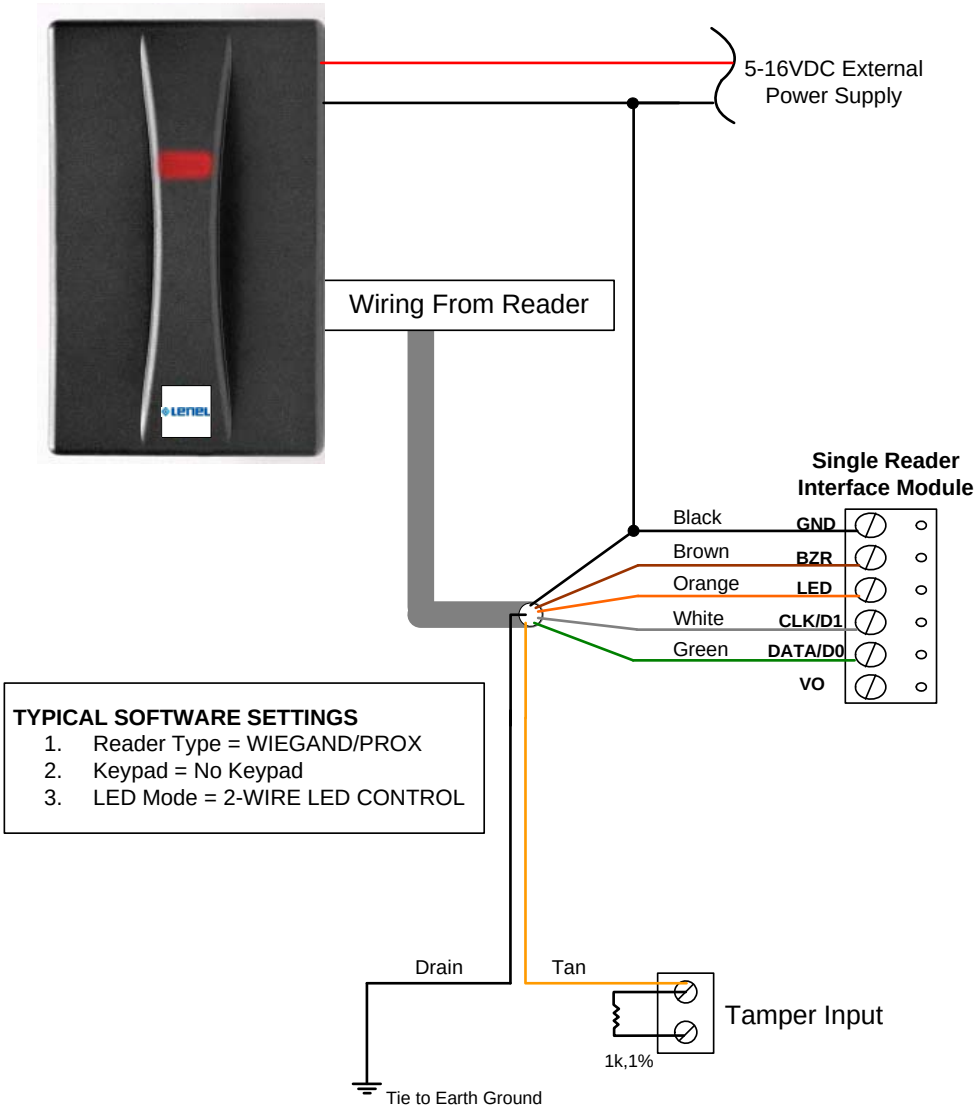
88.2 OpenCard XF1550/XF1560

Models XF1550/XF1560 operate at 5-16 VDC with an average current draw of 110mA, 160mA peak. They can be powered from the reader port of a Series 2 dual reader interface module or intelligent dual reader controller.

Note: When connected to a Series 1 dual reader interface module, they should not be powered from the reader port.

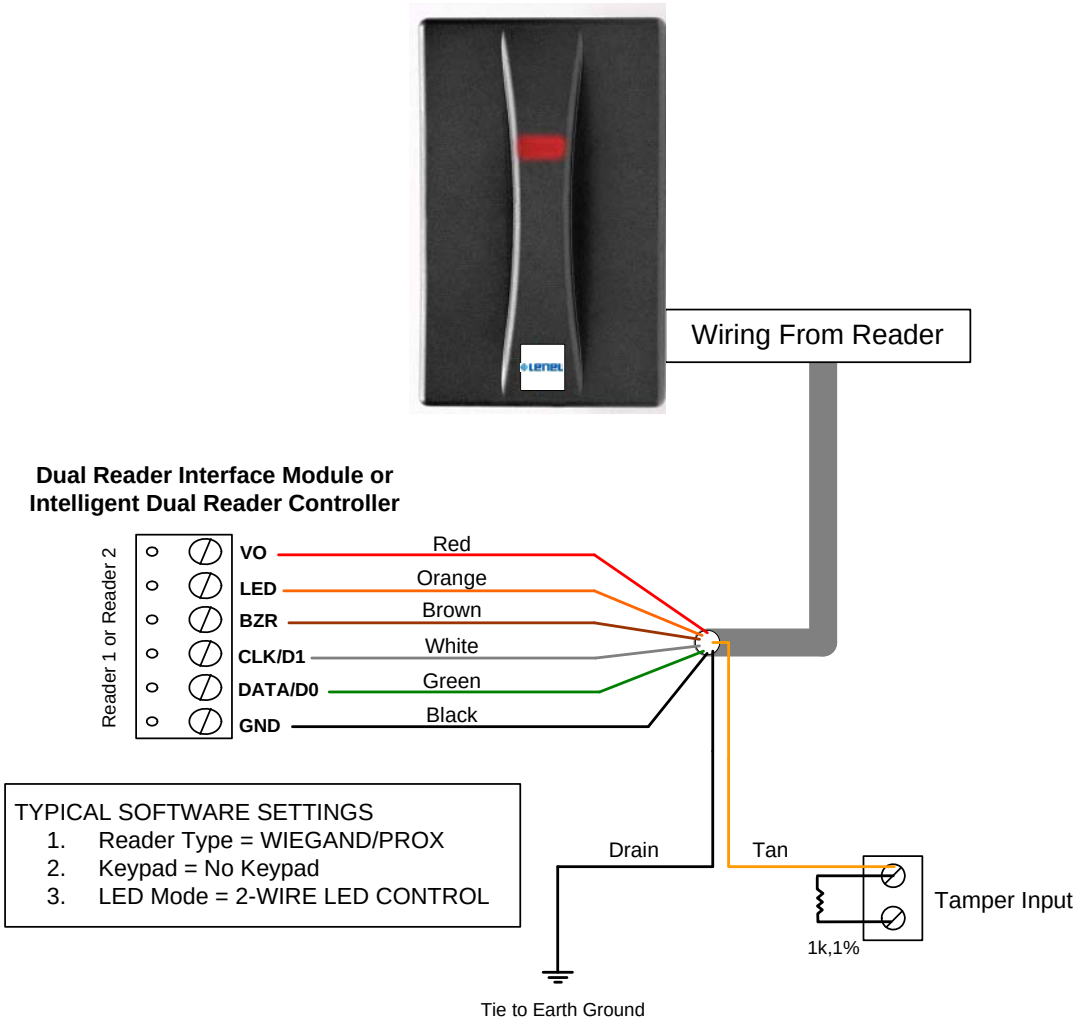
88.2.1 Wiring the LNL-1300

This reader cannot be powered from the single reader interface module.



88.2.2 Wiring the LNL-1320

This reader can be powered from the reader port only when using a Series 2 dual reader interface module or intelligent dual reader controller.



88.3 Specifications

- Power supply: Linear DC
- Voltage range: 8-16 VDC
- Temperature range: -31 to +149° F (-35 to +65° C)
- Card read distance: Distance can vary depending on reader, installation conditions, and credential type.
- Cable distance to panel:
  - 200 feet (60.96 m) maximum - 22 gauge
  - 300 feet (91.44 m) maximum - 20 gauge
  - 500 feet (152.4 m) maximum - 18 gauge
- Wiegand output: Up to 200 bits depending on configuration and card technology

- Tamper output: Open Collector
- Certifications:
  - UL Listed
  - FCC Part 15
  - CE marking

These specifications are subject to change without notice.

LNL-500B BIOMETRIC READER INTERFACE

89 Overview of the LNL-500B

This installation guide is intended for use by technicians who will be installing and maintaining the Biometric Reader Interface Gateway (LNL-500B). The LNL-500B provides real time processing gateway for biometric readers. Readers currently supported include the HandKey CR, HandKey II, ID3D-R, Bioscrypt V-Pass FX and V-Station.

89.1 Interfaces

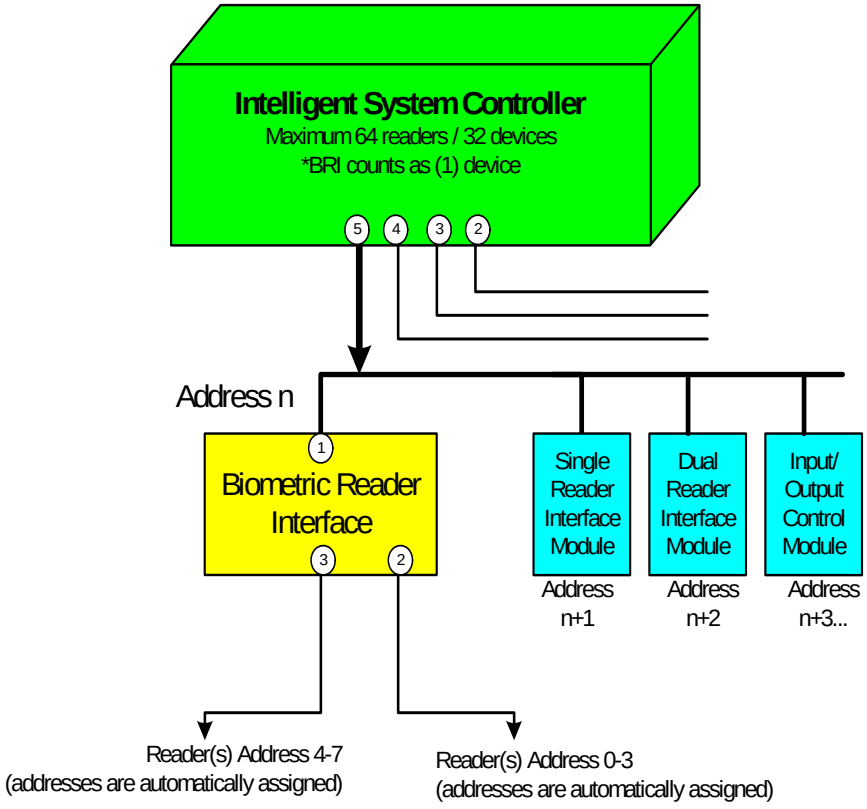
The Biometric Reader Interface Gateway (BRI) interfaces upstream with the Intelligent System Controller, LNL-2000, LNL-3300, or LNL-2220 only. The BRI is NOT supported by the LNL-500 or LNL-1000.

For builds 5.10.309 and earlier, when using a BRI on any downstream port, the address must be set to 0. Other devices can be used on the same downstream port as the BRI; however, the device addressing must be 8 or higher.

For later builds, the BRI can be used with any address. When configuring the reader in OnGuard, a unique reader number will be specified according to the port and address of the BRI. The first reader MUST always be present and be identified as reader number 0.

All readers are consecutively assigned from 0-3 on port 2, and 4-7 on port 3 (be sure to set the address from 0-7 on the biometric readers).

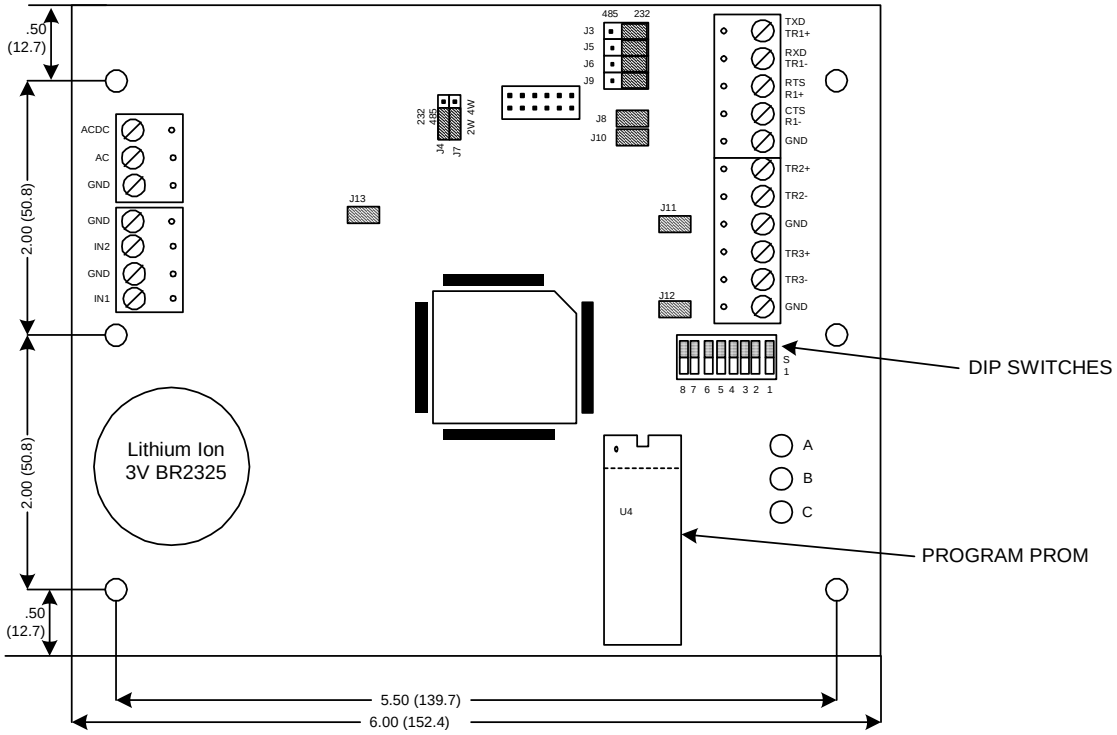
Communications Overview (note that the BRI needs to be at address 0 only with builds 5.10.309 or earlier)



89.2 The Biometric Reader Interface Board

The hardware contains the following components: two (2) unsupervised alarm inputs, one (1) upstream RS-232 or RS-485 interface, two (2) downstream RS-485 interfaces (which can consist of two 2-wire or one 4-wire interfaces), one (1) 12 VDC or 12 VAC power-in input, eight (8) DIP switches, and eleven (11) jumpers. It also contains a set of three (3) status LEDs and one (1) memory backup (3 volt lithium) battery.

The LNL-500B Board



90 Installation

To install the BRI, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the upstream host communication.
2. Wire the power input.
3. Wire the downstream device communication.
4. Cycle power to the device.

90.1 Wiring

90.1.1 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

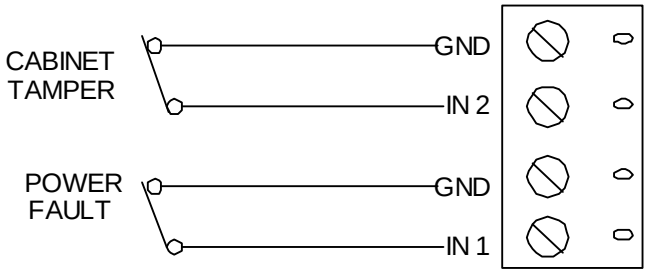
On the biometric reader interface, there are two unsupervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the Input 2 (IN2) and Input 1 (IN1) contact terminals on the BRI board.

Input 2 and Input 1 are both simple N/C (normally closed) contact closure monitors.

Wire the Input 2 and Input 1 contacts using twisted pair cable, 30 ohms maximum. (No EOL resistors are required.)

Note: If either of these inputs is not used, a shorting wire should be installed.

Unsupervised Alarm Input Wiring.



90.1.2 Upstream Host Communication

The BRI uses Port 1 to communicate to the ISC. Port 1 should be wired as 2-wire RS-485 interface for multi-drop or extended distance communication.

For RS-485 communication, the following type of RS-485 cable is required: 24 AWG (minimum) twisted pair (with shields). 2-wire RS-485 cable configuration should be used. The RS-485 cable should be no

longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102, West Penn, or equivalent.) The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

RS-485 Communications

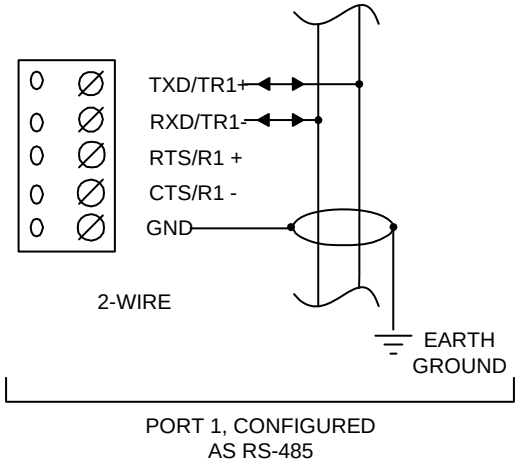
The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multiport communications on a bus transmission line. It allows for high-speed data transfer over extended distance (4000 feet, 1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances End-of-line (EOL) termination is required.

Belden (24 gauge wire – (7x32) Stranded Conductors – Polyethylene Insulated).

Belden Wire Specifications

Trade Number UL NEC Type CSA Certification	Number of Pairs	Nominal D.C. R. Conductor	Shield	Nominal Impedance (Ohms)	Nominal Capacitance	
					pF/feet	pF/meter
9841 NEC CM CSA	1	24.0 ohms/M 78.7 ohms/ km	3.35 ohms/M 11.0 ohms/K	120	12.8	42
9842 NEC CM CSA	2	24.0 ohms/M 78.7 ohms/ km	2.2 ohms/M 7.2 ohms/K	120	12.8	42
88102 NEC CMP CSA	2	24.0 ohms/M 78.7 ohms/ km	15.5 ohms/M 50.9 ohms/km	100	12.95	42

Upstream Host Communication Wiring (Port 1)



Wire Configuration – Switch #5 must be off for all panels in this configuration.

90.1.3 Power

The BRI accepts either a 12 VDC or 12 VAC ± 15% power source for its power input. The power source should be located as close to the BRI as possible.

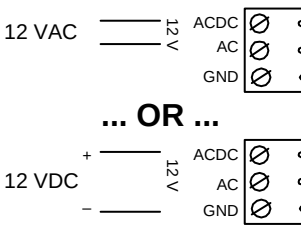
Wire the power input with 18 AWG (minimum) twisted pair cable.

For AC power sources, the following lines are required: AC Line (L), AC Neutral (N). These lines must not be interchanged. A 400 mA RMS current is required for AC power supplies.

For DC power sources, isolated and non-switching, regulated DC power is required. A 250 mA current is required for DC power supplies.

Note: If using a 12 VDC power source *(preferred)*, be sure to observe polarity.

Power Source Wiring



90.1.4 Downstream Device Communication

The BRI can be configured to communicate downstream with up to 8 input/output devices, using Port 2 and Port 3. Each of these ports can only be wired only as a 2-wire RS-485 interface, for multi-drop communication on a single bus of up to 4000 feet.

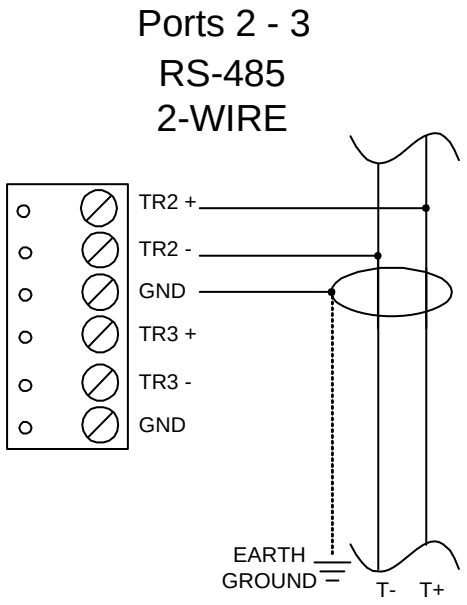
For Ports 2-3, the following type of RS-485 cable is required: 24 AWG (minimum) twisted pair (with shields.) The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102, West Penn, or equivalent). The 485 device drop cables off the main 485 bus (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

Each RS-485 line should contain only 2 terminators, one at each end of the bus. For proper operation, these terminators should be removed.

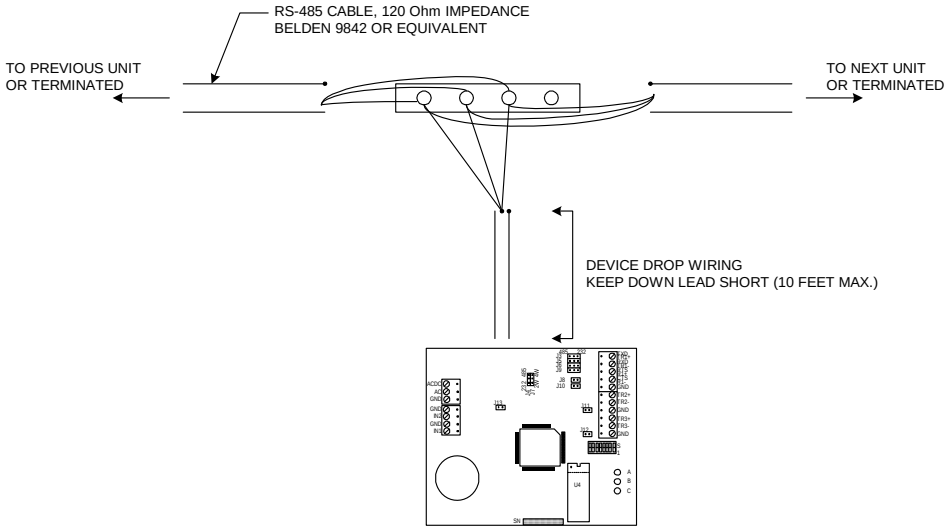
Termination

The typical recommendation calls for termination at each end of the line. The link between the LNL-500B and the biometric devices is fairly short. There may be a need for termination in some unusual cases.

Downstream Device Communication Wiring (Ports 2-3)



Device Drop Wiring



Biometric Reader Interface

To configure the two downstream BRI ports as 2-wire RS-485, follow the 2-wire diagram and repeat on each set of three connectors, TRX+, TRX-, GND.

Notes: The BRI can be located anywhere along the RS-485 line.

Remove the RS-485 terminator for each device that is not an end-of-line device.

91 Configuration

The BRI board contains 8 DIP switches and 11 jumpers that must be configured for your system.

91.1 Setting DIP Switches

The following chart describes the use of each DIP switch.

DIP SWITCH	USED TO CONFIGURE:
1, 2, 3, 4, 5	Interface address
6, 7	Communication baud rate
8	Downstream baud rate (varies depending on firmware type)

91.1.1 Interface Address

To configure the interface address, set DIP switches according to the following table.

ADDRESS	DIP SWITCH				
	1:	2:	3:	4:	5:
0	off	off	off	off	off
1	ON	off	off	off	off
2	off	ON	off	off	off
3	ON	ON	off	off	off
4	off	off	ON	off	off
5	ON	off	ON	off	off
6	off	ON	ON	off	off
7	ON	ON	ON	off	off
8	off	off	off	ON	off
9	ON	off	off	ON	off
10	off	ON	off	ON	off
11	ON	ON	off	ON	off
12	off	off	ON	ON	off
13	ON	off	ON	ON	off
14	off	ON	ON	ON	off
15	ON	ON	ON	ON	off
16	off	off	off	off	ON

ADDRESS	DIP SWITCH				
	1:	2:	3:	4:	5:
17	ON	off	off	off	ON
18	off	ON	off	off	ON
19	ON	ON	off	off	ON
20	off	off	ON	off	ON
21	ON	off	ON	off	ON
22	off	ON	ON	off	ON
23	ON	ON	ON	off	ON
24	off	off	off	ON	ON
25	ON	off	off	ON	ON
26	off	ON	off	ON	ON
27	ON	ON	off	ON	ON
28	off	off	ON	ON	ON
29	ON	off	ON	ON	ON
30	off	ON	ON	ON	ON
31	ON	ON	ON	ON	ON

91.1.2 Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table. This feature controls the baud rate for upstream communication.

BAUD RATE	DIP SWITCH	
	6:	7:
38400 bps	ON	ON
19200 bps	off	ON
9600 bps	ON	off
2400 bps	off	off

91.1.3 Downstream Baud Rate

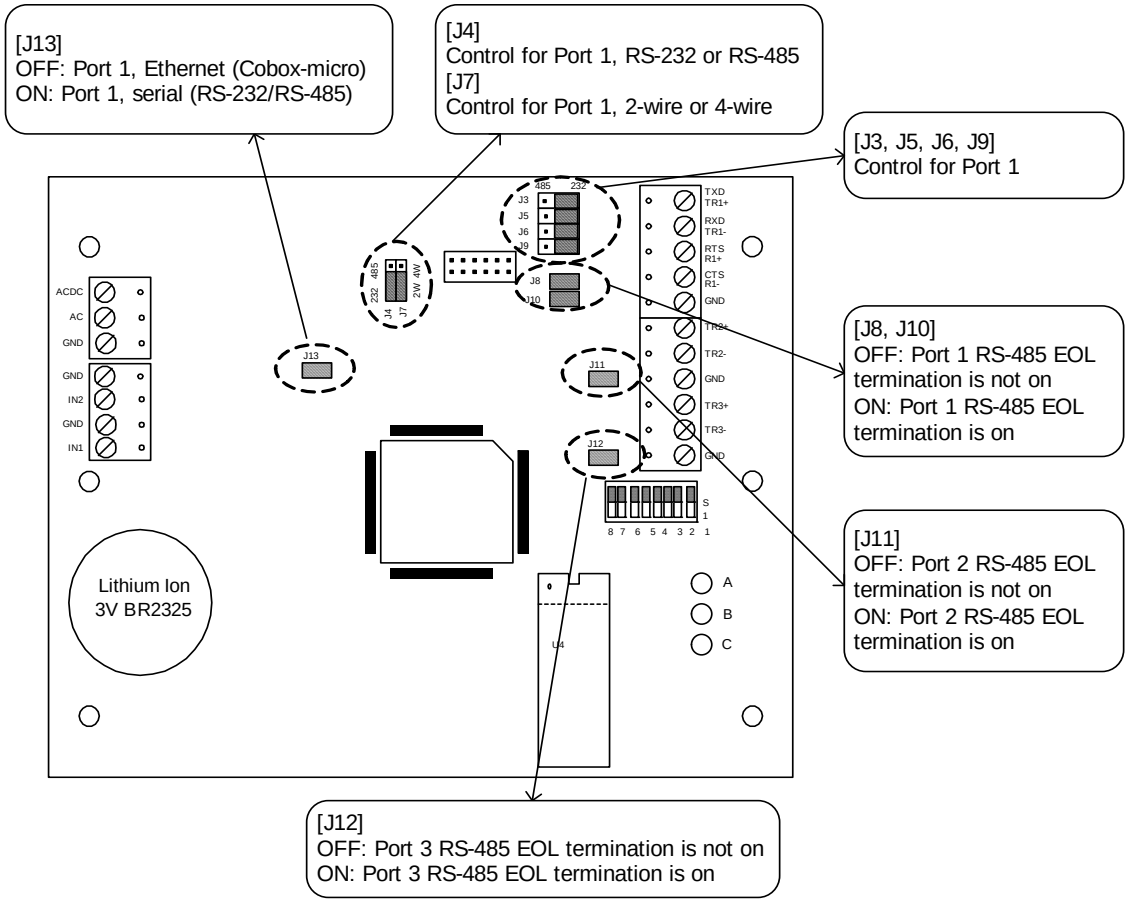
DIP switch 8 controls the downstream baud rate. The setting of DIP switch 8 causes the BRI to behave differently, depending on the type of firmware in use.

DIP SWITCH 8:	Baud rate	
	HandKey	Bioscrypt
off	19200 bps	9600 bps
ON	9600*	38400

* As of HandKey firmware version 1.12, DIP switch 8 in the ON position was 9600. In previous versions, this was 38400 bps.

91.2 Installing Jumpers

The following diagram describes the use of each jumper on the board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.

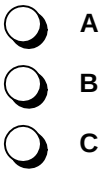


92 Maintenance

92.1 Verification

The BRI board contains three Status LEDs (LED A, LED B, LED C) that can be used to verify correct installation after power up.

BRI Status LEDs



The following chart describes the purpose of each LED on the BRI board.

LED	Purpose
A	This LED blinks rapidly whenever the BRI is powered up and is operating normally.
B	This LED is on when upstream communication to the ISC is in process.
C	This LED is on when downstream communication to biometric readers is in process.

92.2 Memory Backup Battery

Use of the memory backup battery (3 V lithium ion battery, Rayovac BR2325 or Wuhan Lixing CR2330) does not apply to this hardware.

92.3 Firmware

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading.

93 Supported Biometric Readers

It is required that biometric readers be linked to a primary reader using OnGuard software. But it is also possible to set up the reader for PIN and biometric verification.

If the biometric reader is used without a primary reader, it is still necessary to install a standard reader interface module (LNL-1300 or LNL-1320), even though a primary reader is not being used. For this type of configuration, simply do not install the primary reader. Configure the software for card or PIN mode (the biometric reader will still be marked as an alternate reader). Configure the keypad for eight-bit output. In this mode, you may use the keypad of the biometric reader to enter your PIN.

Currently, the following readers are supported for communication with the biometric reader interface gateway:

- Schlage HandKey CR
- Schlage HandKey ID3D-R
- Schlage HandKey II
- Bioscrypt V-Smart A
- Bioscrypt V-Flex
- Bioscrypt V-Pass FX
- Bioscrypt V-Station A

94 Specifications

** The LNL-500B is for use in low voltage, class 2 circuit only.

- Primary Power: (DC or AC)
  - DC input: 12 VDC ± 10%. 250 mA
  - AC input: 12 VAC ± 15%. 400 mA RMS
- Memory and Clock Backup: 3 V lithium (does not apply to this hardware)
- Communication Ports:
  - Port 1: RS-232 or RS-485, 2400 to 38400 bps async
  - Ports 2-3: RS-485 (2-wire), 2400 to 38400 bps async
- Inputs:
  - Cabinet Tamper Monitor: unsupervised, dedicated
  - Power Fault Monitor: unsupervised, dedicated
- Wire Requirements:
  - Power: 1 twisted pair, 18 AWG
  - RS-485: 24 AWG twisted pair(s) with shield, 4000 feet (1219 m) maximum
  - RS-232: 24 AWG, 25 feet (7.6 m) maximum
  - Alarm Input: twisted pair, 30 ohms maximum
- Environmental:
  - Temperature: Operating: 0° to 70° C (32° to 158° F)
  - Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimension: 6 x 5 x 1 in. (152 x 127 x 25 mm)
  - Weight: 8 oz. (290 g) nominal
- Data Memory: 512 KB
- Certifications:
  - UL294 & UL1076 Listed
  - CE marking
  - RoHS compliant

Note: These specifications are subject to change without notice.

HANDKEY READERS

95 Schlage HandKey Readers

OnGuard supports the HandKey CR, ID3D-R, and HandKey II. The HandKey with iCLASS and MIFARE readers are also supported.

95.1 HandKey CR, II, and ID3D-R

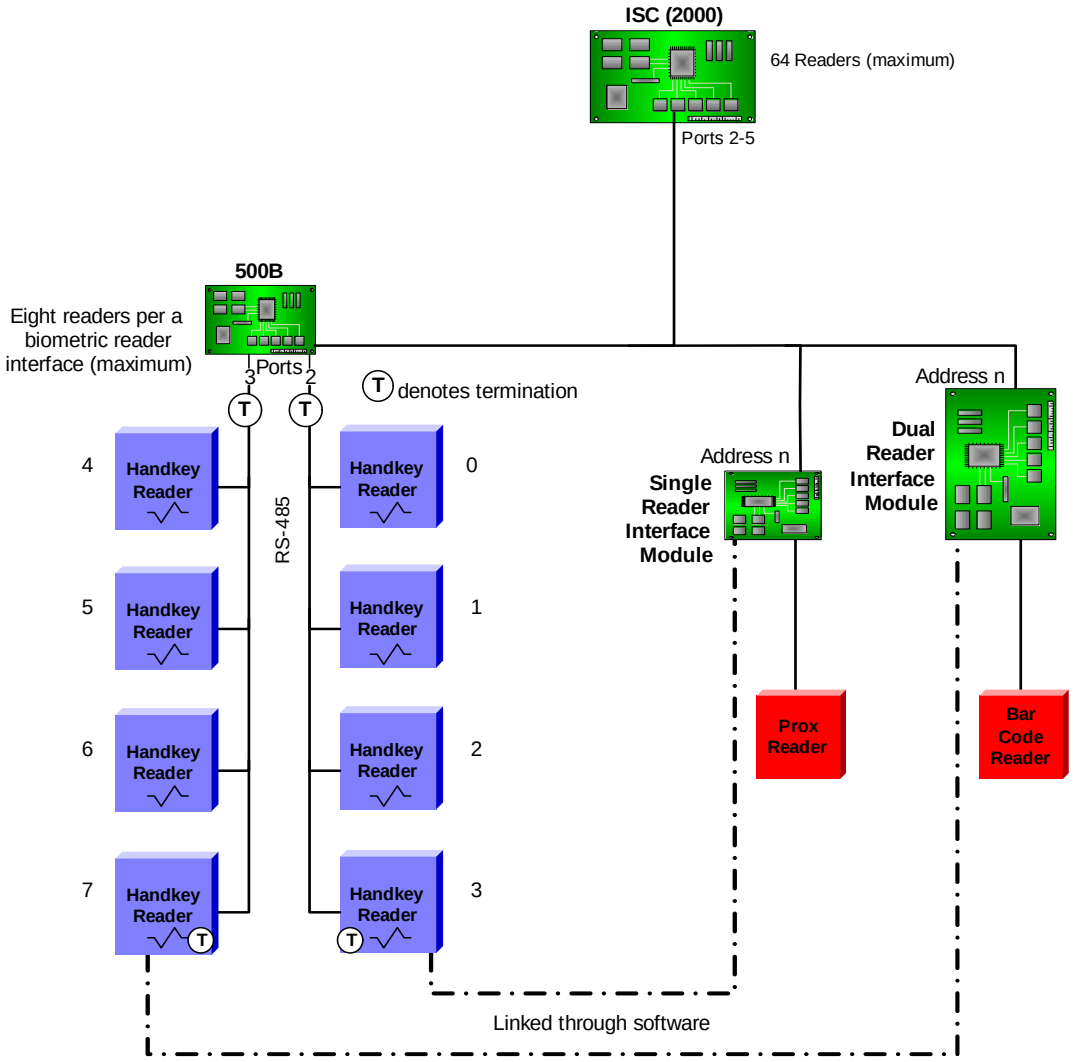
The HandKey CR, II, and ID3D-R are hand geometry readers that can be used for identity verification. These readers interface with the biometric reader interface gateway (LNL-500B).

95.1.1 Diagnostic Mode

To enter diagnostic mode of the HandKey reader, press the star [*] key 10 times. The reader will then run through the following:

- LED and beeper test
- Display the serial number
- Display the onboard memory
- Display the baud rate settings
- Display the date settings
- Display the version of firmware

HandKey Reader Voltage: 12-24 VDC 50/60 H 1 A max.



The Hand Key reader requires termination on the downstream RS-485 ports from the BRI.

95.1.2 HandKey Enrollment

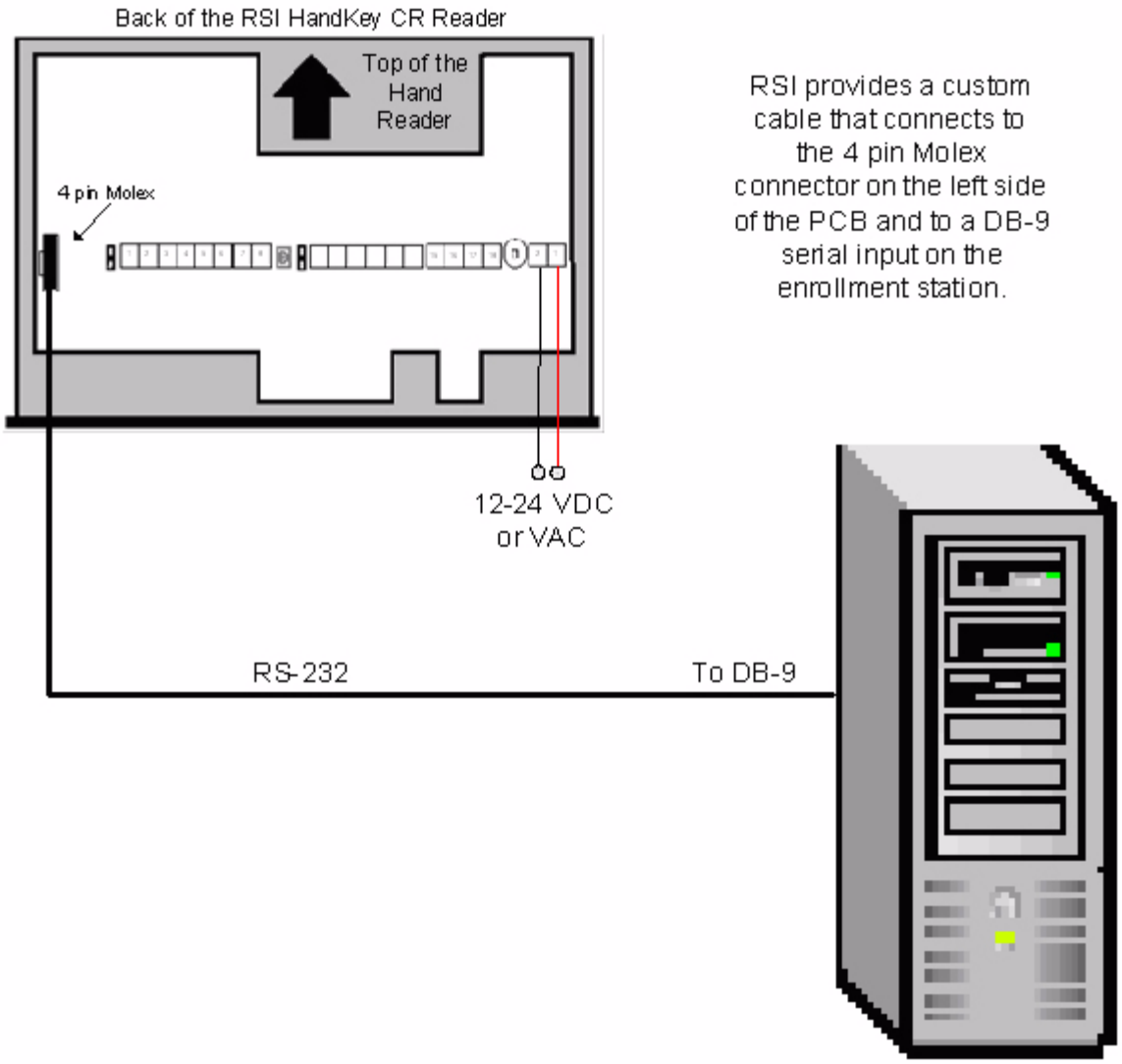
At least one reader must be configured for use as an enrollment reader for biometric information for cardholders. The enrollment reader should be connected directly to the host PC via RS-232 (RJ-45) communication. For the HandKey CR (version F3), a custom cable is provided that connects to the 4-pin Molex connector on the left side of the PCB and to a DB-9 serial input on the enrollment station PC.

HandKey CR readers with firmware revision A.2xx have a 3-pin enrollment RS-232 connector which should be connected to a host machine COM port as follows:

Pin 1	GND to DB9F pin 5
Pin 2	Tx Data to DB9F pin 3

Pin 3	Rx Data to DB9F pin 2

HandKey (version F3) enrollment unit


Back of the RSI HandKey CR Reader
Top of the Hand Reader
4 pin Molex
RSI provides a custom cable that connects to the 4 pin Molex connector on the left side of the PCB and to a DB-9 serial input on the enrollment station.
12-24 VDC or VAC
RS-232
To DB-9

Configure the HandKey (II, CR) reader for enrollment

To use the reader, certain properties must be configured. Refer to the HandKey Installation Manual for these procedures.

1. For HandKey units (version F1), all five of the DIP switches must be in the OFF position. If you need to reset the default configuration, set DIP switches 4 and 5 to the ON position and power up the unit. After five seconds, the switches must be set to OFF again before cycling power or you will lose any configurations that have been changed. HandKey units with version F3 do not have DIP switches.
2. Perform the following procedure to erase the setup programs but retain the user database:
   a. While the system power is off, press the Reset switch.

b. Turn system power ON and wait 5 seconds, then release the switch.

c. The reader's LCD screen will display
```
RESET: 1. SET UP
9. ALL!!!
```

d. Press [1].

3. Enter the Command Mode to complete the following steps. To do so, press both the [Clear] and [Enter] keys at the same time.

4. When you are prompted for a password, enter [2], which is the default for the Setup Menu, and press [Enter].

   To set the following properties, you will be asked a series of Yes/No questions. Follow the prompts on the display. Pressing the [No] button will bypass the setting and take you to the next menu option. Pressing the [Yes] button will allow you to change the current setting.

5. Set the language (You will also need to do this for verification readers). The default is English.

   Enter [Yes] at the prompt to set the language. Once you do this, selecting [No] will allow you to pass each current language setting. When your preferred language is displayed, press the [Yes] button.

   The display will return to the start of the SET LANGUAGE command. Select [No] to move onto the next menu.

6. Set the date format (You will also need to do this for verification readers).

   Enter [Yes] at the prompt to set the date format. Once you do this, selecting [No] will allow you to pass each current date format. When the preferred date format is displayed, press the [Yes] button.

   The display will return to the start of the SET DATE FORMAT command. Select [No] to move onto the next menu.

7. Set the time and date (You will also need to do this for verification readers).

   Time is kept using a 24 hour clock. The hour is represented by two digits, 00 to 23. The minute is represented by two digits, 00 to 59.

   The date is also numerical. The month is represented by two digits (January=01, incrementing to December=12). The day is represented by two digits, 01 through 31. The year is represented by two digits corresponding to the last two digits of the current year.

   Enter [Yes] at the prompt to set the time and date. You will then be asked for the month. Enter the number for the month and press [Yes]. After this, you will be asked for the day. Enter the number, followed by the [Yes] button.

   Do the same for the year, hour, and minute.

   The display will then return to the start of the SET TIME & DATE command.

8. Set Address, Set ID Length, Set Facility, and Set Aux Out Control are not used for enrollment. Press [No] to pass through these menu options.

9. Set the reader mode to remote. If the reader is not already set to remote reader mode, do so. Press the [No] button to move through the menus until SET READER MODE appears on the display. Then press [Yes].

   When TO MASTER appears on the display, press [No]. When TO REMOTE appears on the display, press [Yes]. If you are prompted for an address, enter zero (0).

Note: A single dash (–) on either side of the READY prompt on the display indicates that the reader is in remote mode. A double dash (=) on either side of the READY prompt on the display indicates that the reader is in master mode.

10. Set the serial to RS-232.

    Enter [Yes] at the prompt to set the serial. Once you do this, the option for RS-485/RS-422 will be displayed. Enter [No]. When the option for RS-232 is displayed, enter [Yes].

    The display will now prompt you to set the baud rate.

11. Set the baud rate to match the settings in the software, according to the hand geometry capture screen. It is recommended that you use a baud rate of 28.8 Kbps.

    Enter [No] to pass each baud rate. When the preferred baud rate is displayed, press the [Yes] button.

12. The display will return to the start of the RS-232 option. Press the [No] button to move onto the next menu.

13. The Printer/PC option appears on the display. Select the option to use RS-232 for 1-Host.

    Once the selection has been made, the display returns to the start of the SET SERIAL option.

14. To exit from the menu, press the [Clear] button.

HandKey ID3D-R

To use the reader, certain properties must be configured. Refer to the HandKey Installation Manual for these procedures.

1. DIP switches SW 1, SW 2, and SW 4 must be in the OFF position and SW 3 must be in the ON position. If you need to reset the default configuration, set DIP switch SW 4 to the ON position and power up the unit. Memory will be reset. After five seconds, SW 4 must be set to OFF again before cycling power or you will lose any configurations that have been changed.

2. Enter the Command Mode to complete the following steps. To do so, press the [#] key after the unit has been powered up and displays “READY.”

3. When you are prompted for a password, enter [3], which is the default password for the Management Menu, and press [Enter].

    To set the following properties, you will be asked a series of Yes/No questions. Follow the prompts on the display. Pressing the [No] button will bypass the setting and take you to the next menu option. Pressing the [Yes] button will allow you to change the current setting.

4. Set the time and date (You will also need to do this for verification readers).

    Time is kept using a 24 hour clock. The hour is represented by two digits, 00 to 23. The minute is represented by two digits, 00 to 59.

    The date is also numerical. The month is represented by two digits (January=01, incrementing to December=12). The day is represented by two digits, 01 through 31. The year is represented by two digits corresponding to the last two digits of the current year.

    Enter [Yes] at the prompt to set the time and date. You will then be asked for the month. Enter the number for the month and press [Yes]. After this, you will be asked for the day. Enter the number, followed by the [Yes] button.

    Do the same for the year, hour, and minute.

    The display will then return to the start of the SET TIME & DATE command.

5. Exit the Command Mode. When the * NO YES # prompt is shown on the display, pressing any number will exit the Command Mode.

6. Enter the Setup Menu by pressing the [#] key when this unit is displaying “READY” and enter [2] for the password when prompted. This is the default password for the Setup Menu.

7. Set the reader mode to remote. If the reader is not already set to remote reader mode, do so. Press the [No] button to move through the menus until SET READER MODE appears on the display. Then press [Yes].

   When TO MASTER appears on the display, press [No]. When TO REMOTE appears on the display, press [Yes]. If you are prompted for an address, enter zero (0).

   Note: A single dash (–) on either side of the READY prompt on the display indicates that the reader is in remote mode. A double dash (=) on either side of the READY prompt on the display indicates that the reader is in master mode.

8. Set the serial to RS-422/RS-485. However, serial communication to the host is done via RS-232. You will need an RS-422/RS-485 to RS-232 converter.

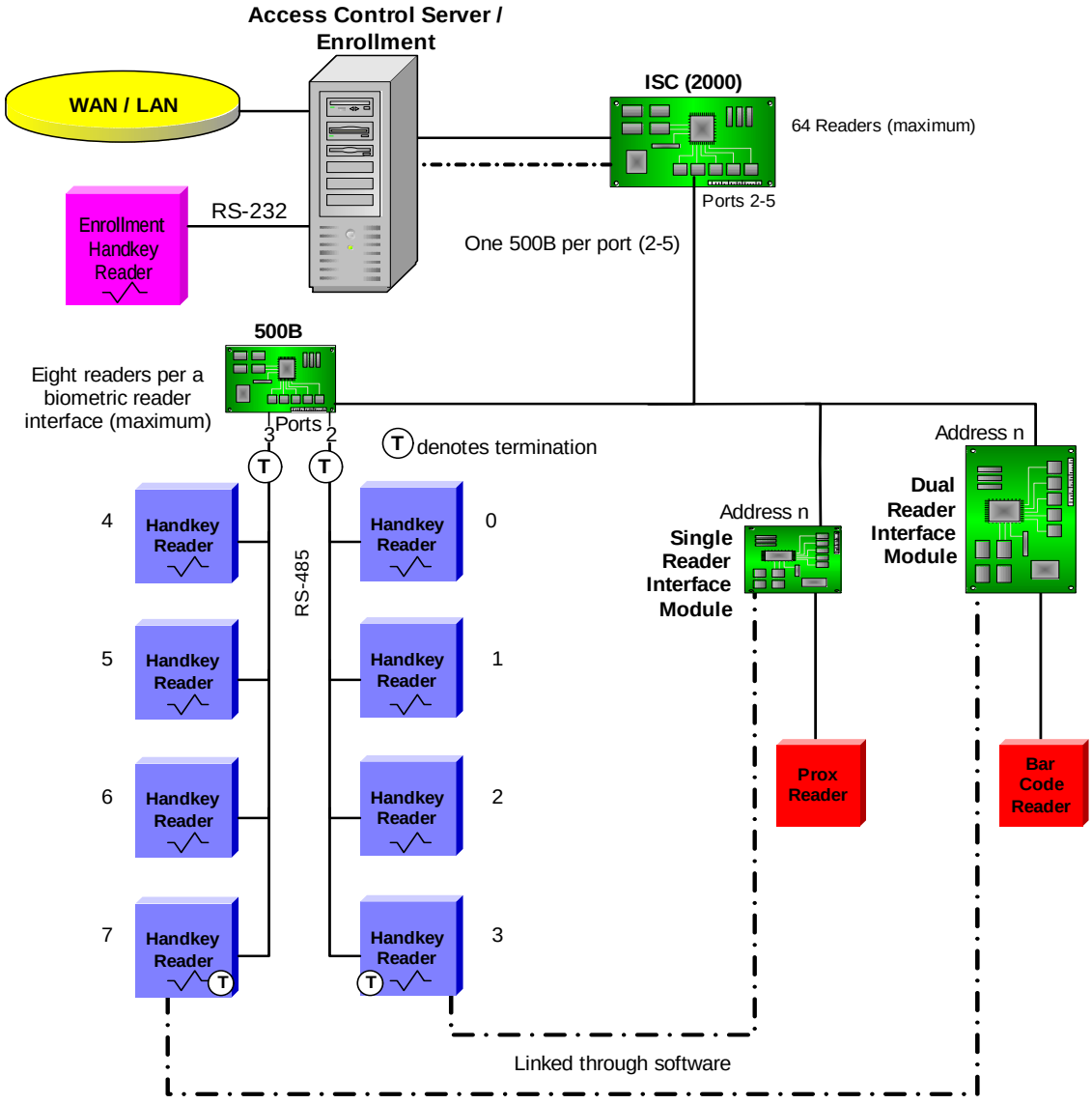
9. Set the baud rate to match the settings in the software, according to the hand geometry capture screen. You will be prompted for a baud rate code. Enter a single digit for the desired baud rate according to the following table.

BAUD RATE	CODE	BAUD RATE	CODE
38.4 K	0	19.2 K	1
9600	2	4800	3
2400	4	1200	5
600	6	300	7

10. To exit from the menu, press the any number button when the reader displays the * NO YES # prompt.

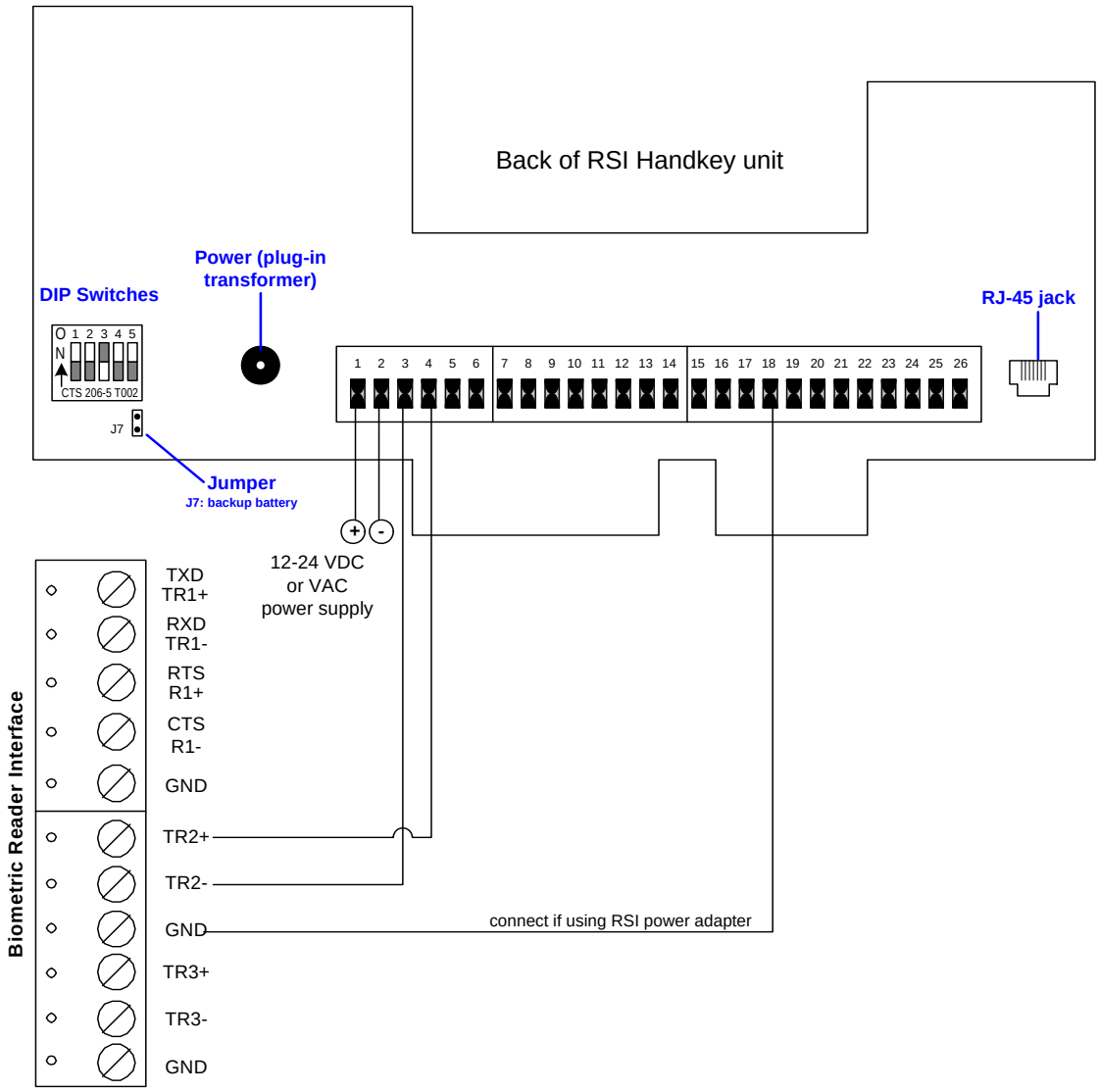
95.1.3 Identity Verification using the HandKey

The 500B can be interfaced with the HandKey-II, HandKey-CR, or ID3D-R.

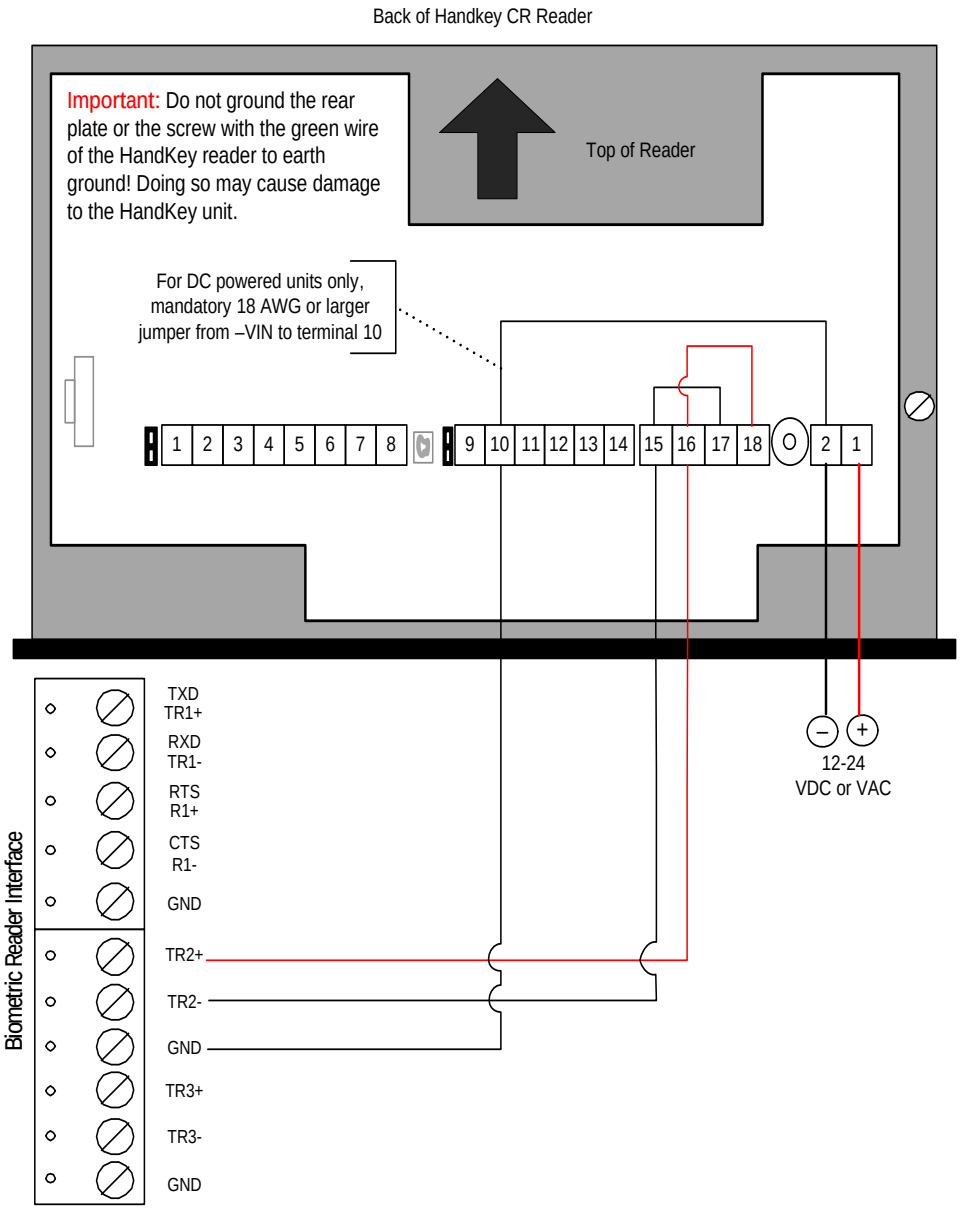


Wire the HandKey for Verification

HandKey version F1



HandKey version F3


Back of Handkey CR Reader
Important: Do not ground the rear plate or the screw with the green wire of the HandKey reader to earth ground! Doing so may cause damage to the HandKey unit.
Top of Reader
For DC powered units only, mandatory 18 AWG or larger jumper from –VIN to terminal 10
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16 17 18
2 1
Biometric Reader Interface
TXD TR1+
RXD TR1-
RTS R1+
CTS R1-
GND
TR2+
TR2-
GND
TR3+
TR3-
GND
12-24 VDC or VAC

95.1.4 Signal Ground

The RS-485 signal ground connection (TB2 GND) needs to be connected to the HandKey signal ground. There is no specific terminal designated for this purpose on the HandKey, but any of the following terminals are appropriate for this purpose:

- HandKey F1 Signal Ground Terminals: 8, 10, 12, 14, 18, 20, 22, 24, or 26
- HandKey F3 Signal Ground Terminals: 4, 10, or 13

Important: In either AC or DC power source applications, do not connect the HandKey unit's ground lug or rear plate to earth ground. This signal is internally connected to the HandKey signal ground, and therefore connection of that signal to earth ground would be a cause for ground loops in multi-dropped configurations.

95.1.5 Power

If the HandKey unit is powered from an AC source, then connect the AC Power source to +VIN and -VIN, as indicated in the diagram. Note, however, that this AC source should NOT be shared to power more than one HandKey unit (a single AC source should not drive parallel bridge rectifiers).

If the HandKey unit is powered from a DC source, then connect the DC Power to +VIN and -VIN, as indicated. To remove the diode from the return path, connect a jumper wire (18 AWG) from -VIN to any of the signal ground terminals. Note that sharing a common DC power supply among several units, including the LNL-500B is allowed in this configuration.

95.1.6 Communication

For RS-485 (2-wire) communication, jumper blocks 15 to 17, and 16 to 18.

For HandKey readers, the address for verification readers must be set initially. For more information about reader functions, refer to the HandKey documentation.

Configure the HandKey (II, CR) for Verification

Schlage readers must be configured for use as a verification reader for cardholder biometric information. To use the reader, certain properties must be configured. Refer to the HandKey Installation Manual for these procedures.

1. From the default configuration, enter the Setup Menu by pressing both the [Clear] and [Enter] keys at the same time. When prompted for the password, enter the default, [2], followed by the [Enter] button.

   To set the following properties, you will be asked a series of Yes/No questions. Follow the prompts on the display. Pressing the [No] button will bypass the setting and take you to the next menu option. Pressing the [Yes] button will allow you to change the current setting.

2. Set the language.

   The default is English. Enter [Yes] at the prompt to set the language. Once you do this, selecting [No] will allow you to pass each current language setting. When your preferred language is displayed, press the [Yes] button.

   The display will return to the start of the SET LANGUAGE command. Select [No] to move onto the next menu.

3. Set the date format.

   Enter [Yes] at the prompt to set the date format. Once you do this, selecting [No] will allow you to pass each current date format. When the preferred date format is displayed, press the [Yes] button.

   The display will return to the start of the SET DATE FORMAT command. Select [No] to move onto the next menu.

4. Set the time and date.

   Time is kept using a 24 hour clock. The hour is represented by two digits, 00 to 23. The minute is represented by two digits, 00 to 59.

   The date is also numerical. The month is represented by two digits (January=01, incrementing to December=12). The day is represented by two digits, 01 through 31. The year is represented by two digits corresponding to the last two digits of the current year.

   Enter [Yes] at the prompt to set the time and date. You will then be asked for the month. Enter the number for the month and press [Yes]. After this, you will be asked for the day. Enter the number, followed by the [Yes] button.

   Do the same for the year, hour, and minute.

   The display will then return to the start of the SET TIME & DATE command.

5. Set the address. Each reader must have a unique address.

   When the option to set address is displayed, press [Yes] to set the reader address. The current address will appear on the display. To set a new address, type in the number followed by [Yes] to set it. The display will return to the start of the SET ADDRESS command.

6. SET ID LENGTH, SET FACILITY, and SET AUX OUT CONTROL are not used for verification. Press [No] to pass through these menu options.

7. Set the reader mode to remote. If the reader is not already set to remote reader mode, do so. Press the [No] button to move through the menus until SET READER MODE appears on the display. Then press [Yes]. When TO MASTER appears on the display, press [No]. When TO REMOTE appears on the display, press [Yes]. If you are prompted for an address, enter zero (0).

   Note: A single dash (–) on either side of the READY prompt on the display indicates that the reader is in remote mode. A double dash (=) on either side of the READY prompt on the display indicates that the reader is in master mode.

8. Set the serial to RS-485.

   Enter [Yes] at the prompt to set the serial. Once you do this, the option for RS-485/RS-422 will be displayed. Press the [Yes] button. The display will now prompt you to set the baud rate.

9. Set the baud rate to match the LNL-500B DIP switch setting. 19200 baud rate is recommended.

   Enter [No] to pass each baud rate. When 19200 baud is displayed, press the [Yes] button.

10. The display will return to the start of the RS-485/RS-422 option. Press [No] to move onto the next menu.

    Once the selection has been made, the display will return to the start of the SET SERIAL option.

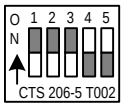
11. SET DURESS CODE, SET BEEPER, and UPGRADE are not used for verification. Press [No] to pass through these menu options and return to the beginning of the menu or you may exit from the menu, by pressing the [Clear] button.

12. To exit, press the [Clear] button.

    Note: All users initially have the lowest authority level, 0. It is recommended that you set a user authority level of 5 (which is the highest) for the master service code.

HandKey II Reader DIP Switches

If you are using HandKey (II or CR) version F1, the DIP switches need to be set properly for RS-485 communication.

	Switch 1	EOL termination	ON	Enable EOL termination
			OFF	Disable EOL termination
	Switch 2	EOL termination	ON	Enable EOL termination
			OFF	Disable EOL termination
	Switch 3	Communication method (Leave switch 3 in the ON position for all verification readers)	ON	2-wire RS-485
			OFF	4-wire RS-485
	Switch 4	Erase hand reader setup	To erase the setup programs but retain the user database: With system power OFF, set switch 4 ON. Turn system power ON and wait 5 seconds. Turn switch 4 OFF.	
	Switch 5	Erase hand reader setup and database	To erase both the hand reader setup and user database: With system power OFF, set both switches 4 and 5 ON. Turn system power ON and wait 5 seconds. Turn both switches 4 and 5 OFF.	

Resetting the HandKey Reader

1. Remove power and battery jumper, if a back up battery is being used.
2. Press down on the reset button and apply power.
3. Release button after LCD displays “Erase Memory.”
   - Press [1] to erase settings i.e. address, outputs, passwords, but retain database/users
   - Press [9] to erase everything i.e. factory defaults, settings and database

95.1.7 Wire the HandKey ID3D-R for Verification

The following table lists the wiring connections needed for verification. The readers should be wired for either port 2 or 3 on the biometric reader interface.

LNL-500B	**ID3D-R Reader**	
TR2+ (or TR3+)	7	RS-485 RT+
TR2- (or TR3-)	6	RS-485 RT-
GND	11	Ground
ACDC	1	+13.8 VDC

LNL-500B	ID3D-R Reader	
GND	2	Ground

Configure the HandKey ID3D-R for Verification

To use the reader for verification purposes, certain properties must be configured. Refer to the HandKey Installation Manual for these procedures.

1. DIP switches SW 1, SW 2, and SW 4 must be in the OFF position and SW 3 must be in the ON position. If you need to reset the default configuration, set DIP switch SW 4 to the ON position and power up the Schlage unit. Memory will be reset. After five seconds, SW 4 must be set to OFF again before cycling power or you will lose any configurations that have been changed.
2. Enter the Command Mode to complete the following steps. To do so, press the [#] key after the unit has been powered up and displays “READY.”
3. When you are prompted for a password, enter [3], which is the default password for the Management Menu, and press [Enter].

   To set the following properties, you will be asked a series of Yes/No questions. Follow the prompts on the display. Pressing the [No] button will bypass the setting and take you to the next menu option. Pressing the [Yes] button will allow you to change the current setting.
4. Set the time and date (You will also need to do this for verification readers).

   Time is kept using a 24 hour clock. The hour is represented by two digits, 00 to 23. The minute is represented by two digits, 00 to 59.The date is also numerical. The month is represented by two digits (January=01, incrementing to December=12). The day is represented by two digits, 01 through 31. The year is represented by two digits corresponding to the last two digits of the current year.

   Enter [Yes] at the prompt to set the time and date. You will then be asked for the month. Enter the number for the month and press [Yes]. After this, you will be asked for the day. Enter the number, followed by the [Yes] button.

   Do the same for the year, hour, and minute.

   The display will then return to the start of the SET TIME & DATE command.
5. Exit the Command Mode. When the * NO YES # prompt is shown on the display, pressing any number will exit the Command Mode.
6. Enter the Setup Menu by pressing the [#] key when this unit is displaying “READY” and enter [2] for the password when prompted. This is the default password for the Setup Menu.
7. Set the reader mode to remote. If the reader is not already set to remote reader mode, do so. Press the [No] button to move through the menus until SET READER MODE appears on the display. Then press [Yes].

   When TO MASTER appears on the display, press [No]. When TO REMOTE appears on the display, press [Yes].
8. If you are prompted for an address, enter the address for the reader (0-7).

> **Note:** A single dash (–) on either side of the READY prompt on the display indicates that the reader is in remote mode. A double dash (=) on either side of the READY prompt on the display indicates that the reader is in master mode.

9. Set the serial to RS-422/RS-485. However, serial communication to the host is done via RS-232. You will need an RS-422/RS-485 to RS-232 converter.

10. You will then be asked to set the baud rate for channel 0 (RS-485 baud rate). Set the baud rate to match the setting of the biometric reader interface. You will be prompted for a baud rate code (the default is usually 19.2 Kbps). Enter a single digit for the desired baud rate according to the following table.

BAUD RATE	CODE	BAUD RATE	CODE
38400	0	19200	1
9600	2	4800	3
2400	4	1200	5
600	6	300	7

11. You will also be prompted for the baud rate of channel 1 (RS-232 baud rate). This is not applicable for verification mode on this reader.
12. To exit from the menu, press the any number button when the reader displays the * NO YES # prompt.

HandKey ID3D-R Reader DIP Switches

The DIP switches need to be set properly for RS-485 communication. For more information, please refer to the HandKey Installation Manual.

ID3D DIP Switch	Description
1	EOL termination for RS-422 (To enable EOL termination, turn this DIP switch ON.)
2	EOL termination for RS-485 (To enable EOL termination, turn this DIP switch ON.)
3	Selects RS-485 (This DIP switch should be ON for all verification readers.)
4	Erases configuration

95.1.8 HandKey Reader Operation

For more detailed information, please refer to your Schlage HandKey Installation and Operation Manual.

The hand reader is ordinarily used in conjunction with a primary reader. To gain access, cardholders must present their badge and then place their hand on the hand reader’s platen.

If the access control software is configured for use of card or PIN, the keypad of the hand reader may alternately be used. Enter the PIN, followed by the [#] key or [Enter] key. The hand reader will then prompt users to place their hand on the platen. The Schlage unit supports up to 9 digits for the PIN code. Leading zeroes are not supported.

Note: Currently, keypad commands using the [*] key are not supported.

95.2 MIFARE/iCLASS HandKey Reader

Along with the hand geometry, the readers have the added MIFARE or iCLASS functionality.

Capture biometric information using the HandKey CR with firmware version HKC-A.122D or higher.

MIFARE cards can be encoded with one of the following devices:

- GemEasyAccess 332 encoder
- GemEasyLink 680S encoder
- DigiOn24 encoder

iCLASS cards can be encoded with one of the following devices:

- HID iCLASS programmer that supports serial protocol 1.0.6
- DigiOn24 iCLASS with encoder module firmware version 2.0.0 or higher

These devices can be configured according to the instructions in the OEM Device Configuration Guide. Once cards are encoded, they can be used on the MIFARE or iCLASS HandKey readers.

95.2.1 Encoding

The device used to encode the card must be configured in OnGuard under Workstations in the Encoders/ Scanners tab.

Encoder Configuration

1. In the General tab:
   a. Under **Name**, type in a unique name for the device.
   b. Select the workstation to which it is connected.
   c. For the **Device type**, select one of the following:
      – **GemEasyLink680/GemEasyAccess332** for the GemEasyAccess 332 encoder or GemEasyLink 680S encoder
      – **Digion24 (MIFARE)** or **DigiOn24 (iCLASS)** for the DigiOn24 encoder
      – **HID iCLASS** for HID iCLASS encoders
   d. For the **Credential technology**, select **MIFARE** or **iCLASS**.
2. In the Location tab, configure the encoder to be a standalone device or an in-line device.
3. In the Communications tab, configure the COM port settings. The settings should match those of the encoder.

Capturing the Hand Geometry Template

A hand geometry template must be captured and associated with an encoded card. Connect and configure a HandKey CR to the workstation.

1. In the Cardholders screen, under the Biometrics tab, select the Hand Geometry tab.
2. Select the radio button to use the system threshold value, or you may enter a customized individual reject threshold.
3. Select the correct COM port and baud rate for the HandKey CR. Click [Connect]. The connection status will display “Connected.”
4. Click [Start Capture].

5. Select which hand you would like to capture. Click [OK].
6. Follow the instructions displayed on the HandKey CR. At any time, if you wish to cancel, click [Abort Capture].
7. When the status displays, “Biometric template capture completed,” click [OK].
8. After exiting the capture screen, click [OK] again to save the biometric template.

Card Format

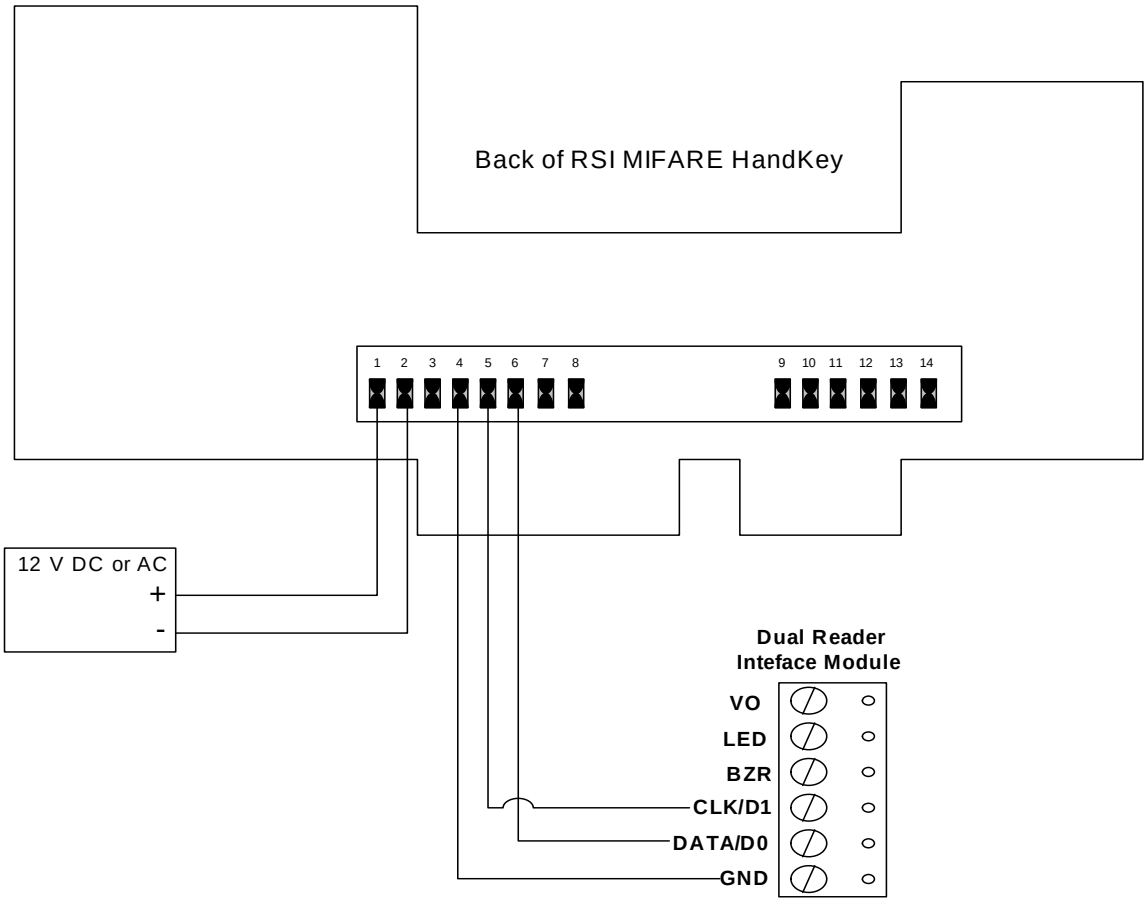
Now that the encoder has been set up and the hand geometry template was captured, the card format must be configured. Configure a Wiegand card format for the HandKey reader. This will be used to configure the smart card.

Configuring the Smart Card Format

1. Under the Card Format tab:
   a. Type in a unique name for the card format.
   b. For **Application**, select **HandKey (MIFARE)** or **HandKey (iCLASS)**.
   c. If **Store Reject Threshold** is checked and the custom reject threshold was set during capture, then the custom value will be encoded as well. During verification, the reader will check if there is a custom threshold encoded on the card. The custom threshold will be used if it is available; otherwise, it will use its pre-programmed default reject threshold.
   d. Type in the **Application Key** that matched the key hard-coded in the reader. They key must be entered in a 12-digit hex format for MIFARE, or 16-digit hex format for iCLASS.
   e. For MIFARE, the **Application Sectors** should be **2,3**. For iCLASS, the memory configuration should be one of the following:
      – 2K Bits/2 Application Areas
      – 16K Bits/2 Applications Areas
      – 16K Bits/16 Application Areas
   f. Leave the default setting for the card layout (for both MIFARE and iCLASS).
2. Assign the smart card format to the badge type.
   a. On the Badge Type screen, select the badge type and click [Modify].
   b. Under the Encoding tab, click [Add].
   c. Select the card format configured in the previous step. Click [OK].
   d. On the Badge Type screen, click [OK]. The badge type is now configured for the HandKey application.
3. Encode the MIFARE or iCLASS card with HandKey.
   a. Once a cardholder has a hand geometry template captured and the correct badge type assigned, click [Encode].
   b. Select the HandKey application.
   c. Click [Encode] in the Encode Badge screen.
   d. Choose the encoder and click [Encode]. Follow the instructions displayed on the screen.
   e. Once encoding is complete, a message box will appear to confirm. Click [OK].

95.2.2 Wiring the MIFARE/iCLASS HandKey for Verification

The MIFARE/iCLASS HandKey reader must be wired to a single or dual reader interface module (LNL-1300 or 1320). It will NOT function when wired to the biometric gateway.



Configure the MIFARE/iCLASS HandKey Reader for Verification

In order to function properly with OnGuard, the MIFARE HandKey reader must be running firmware version HK2-11045A.247 or higher. The iCLASS HandKey reader must be running firmware HK2-11142A.175 or higher.

To set the properties, you will be asked a series of Yes/No questions. Follow the prompts on the display. Pressing the [*/No] button will bypass the setting and take you to the next menu option. Pressing the [#/Yes] button will allow you to change the current setting.

1. To enter the Setup Menu, press both the [Clear] and [Enter] keys at the same time. When prompted for the password, enter the default, [2], followed by the [Enter] button.
2. Set the language.
   The default is English. If this is acceptable, press [*/No] to move onto the next option.
   If you wish to change it, enter [#Yes] at the prompt to set the language. Once you do this, selecting [*/No] will allow you to pass each current language setting. When your preferred language is displayed, press the [#/Yes] button. The display will return to the start of the SET LANGUAGE command. Select [*/No] to move onto the next menu.

3. Set the date format.

   If the date format is acceptable, press [*/No] to move onto the next option.

   Or enter [#/Yes] at the prompt to set the date format. Once you do this, selecting [*/No] will allow you to pass each current date format. When the preferred date format is displayed, press the [#/Yes] button.

   The display will return to the start of the SET DATE FORMAT command. Select [*/No] to move onto the next menu.

4. Set the time and date.

   If you do not need to set the time and date, press [*/No] to move onto the next option.

   Time is kept using a 24 hour clock. The hour is represented by two digits, 00 to 23. The minute is represented by two digits, 00 to 59. The date is also numerical. The month is represented by two digits (January=01, incrementing to December=12). The day is represented by two digits, 01 through 31. The year is represented by two digits corresponding to the last two digits of the current year.

   Enter [#/Yes] at the prompt to set the time and date. You will then be asked for the month. Enter the number for the month and press [#/Yes]. After this, you will be asked for the day. Enter the number, followed by the [#/Yes] button.

   Do the same for the year, hour, and minute.

   The display will then return to the start of the SET TIME & DATE command.

5. Set the address. Each reader must have a unique address.

   When the option to set address is displayed, press [#/Yes] to set the reader address. The current address will appear on the display. To set a new address, type in the number followed by [#/Yes] to set it. The display will return to the start of the SET ADDRESS command.

6. For SET ID LENGTH, press [*/No] to pass through this menu option.

7. Set the reader mode.

   Cycle through the options by pressing [*/No] until you reach SET READER MODE. The device will cycle through the options for SET FACILITY, LOCK/SHUNT TIME, AUX OUT CONTROL; to which you will press [*/No] to get to SET READER MODE. Press [#/Yes].

   When the unit displays TO MASTER, press [#/Yes]. The display will then return to the start of the SET READER MODE command. Press [*/No] to move onto the next setting.

8. Set beeper.

   Cycle through the options by pressing [*/No] until you reach SET BEEPER. The device will cycle through the options for SET SERIAL (the default baud rate is 9600), SET DURESS CODE, PRINT OPTIONS; TO WHICH YOU WILL PRESS [*/No] to get to SET BEEPER. Press [#Yes]. Cycle through the following settings:

   a. TURN BEEPER OFF, press {*/No].

   b. SET BEEPER, press [*/No].

9. When UPGRADE is displayed, press [*/No].

10. After cycling through all of these options, you will be returned to SET LANGUAGE. Press [Clear] to exit the menu.

95.2.3 MIFARE/iCLASS HandKey Reader Operation

The MIFARE/iCLASS HandKey reader has a small slot located on the left side of the device by the reader.

To use the reader:

1. Place the card into the slot on the left side of the device.

2. Once the card is read, the display will ask for biometric verification. Follow the instructions displayed.

a. Place your hand on the platen when instructed to do so.

b. You may be instructed to place your hand a second time.

c. Access is granted/denied, depending on the results of the badge number and hand geometry data from the MIFARE/iCLASS HandKey reader, as well as on the System or Individual Reject Threshold for hand geometry templates selected for the settings to store minimum score per template.

Note: This biometric score will not be displayed in Alarm Monitoring, since the reader interface module is not transmitting biometric information to the host.

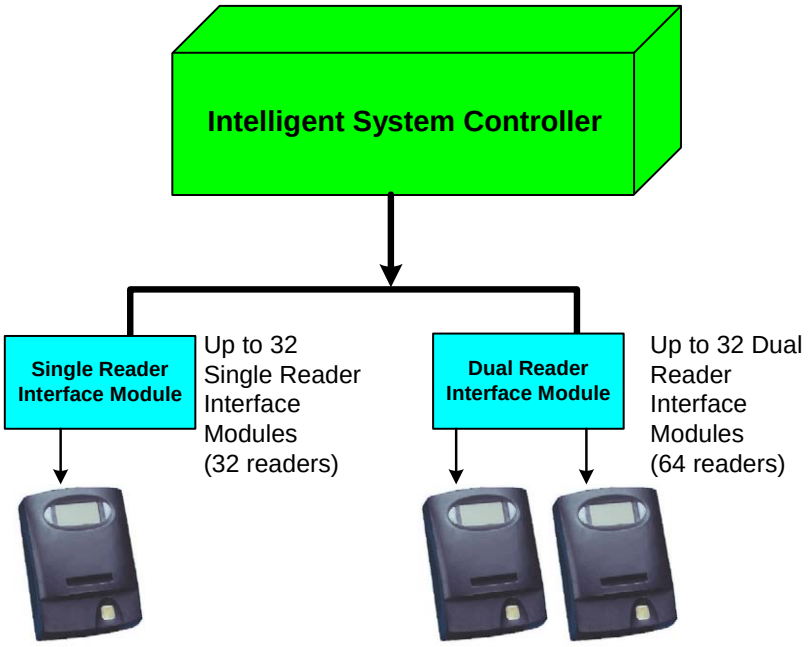
BIOCENTRIC SOLUTIONS

96 Overview

This installation guide is intended for use by technicians who will be installing and maintaining the OnGuard system with Biocentric Solutions, Inc. (BSI) readers (with biometric templates stored on smart cards). The LNL-1300/1320 provides real time processing for the GuardDog and CombiSmart Reader.

96.1 Interfaces

The access readers interface upstream via a Wiegand 72-bit data format with the Reader Interface Module. Multiple Biocentric Solutions devices may be connected in a single network.


Intelligent System Controller
Single Reader Interface Module
Up to 32 Single Reader Interface Modules (32 readers)
Dual Reader Interface Module
Up to 32 Dual Reader Interface Modules (64 readers)

The Biocentric Solutions devices are intelligent devices that can verify the identity of an individual by scanning his or her actual fingerprint and comparing the scanned print with fingerprint data (called a template) printed or stored on a personal identification credential (smart card). The validation is performed at the Combi-device, so no fingerprint data need be stored on or transmitted to a central database.

All sensitive information about an individual is securely stored on the smart card. Transactional data can be collected and stored, and be used directly by the smart card in conjunction with a variety of security applications.

The smart cards used for the readers may utilize any of on the following smart chips:

- Multiflex 8K; ISO 7816-4 file structure
- Cryptoflex 8K; RSA DES, 3DES; ISO 7816-4
- Cryptoflex for Windows 2003

Note: Different readers are required for enrollment and access control.

97 Enrollment Readers

For enrollment, there are three options:

- Axalto Reflex 72 Serial Smart Card Reader used in conjunction with the AuthenTec FingerLock AF-S2 Sensor (USB interface)
- Axalto Reflex USB reader (For installation instructions, refer to the manufacturer documentation.)
- Biocentric Solutions CombiSmart reader (serial interface)
- Biocentric Solutions GuardDog reader (serial interface)

97.1 Wiring Enrollment Readers

Enrollment readers are directly connected to the PC workstation. The following readers may be used for enrollment.

97.1.1 Axalto Reflex Smart Card Readers

The Reflex readers work with all leading ISO 7816-compatible microprocessor cards, including:

- Cryptographic cards
- Java cards
- Subscriber Identity Modules (SIMs)
- Axalto e-gate™ cards

Reflex 72 Serial Interface Reader

The Reflex 72 reader communicates with the workstation through a USB interface. You will need to install the driver before connecting the Reflex 72 reader. Follow the instructions in the Reflex Installation Manual. Once it is connected and the computer is booted up, new hardware will be detected.

Reflex USB Interface Reader

The Reflex USB reader is connected to the USB port. After connecting the reader, you may then install the driver. Follow the instructions in the Reflex USB Installation Guide.

97.1.2 AuthenTec FingerLoc AF-S2 Sensor

The FingerLoc sensor communicates with the workstation through its USB port. Again, new hardware will be detected. Follow the instructions on the screen. The driver for this device can be found on the Supplemental disc.

97.1.3 Biocentric Solutions CombiSmart/GuardDog

The CombiSmart and GuardDog readers communicate with the workstation via RS-232. For GuardDog readers, the desk unit is used for enrollment. Once the reader is connected and the computer is booted up, new hardware will be detected.

The CombiSmart/GuardDog readers work with any card that uses the Philips Electronics MIFARE standard, complies with the ISO/IEC 14443, and has at least 1-KByte (*-Kbit) of memory, such as the following:

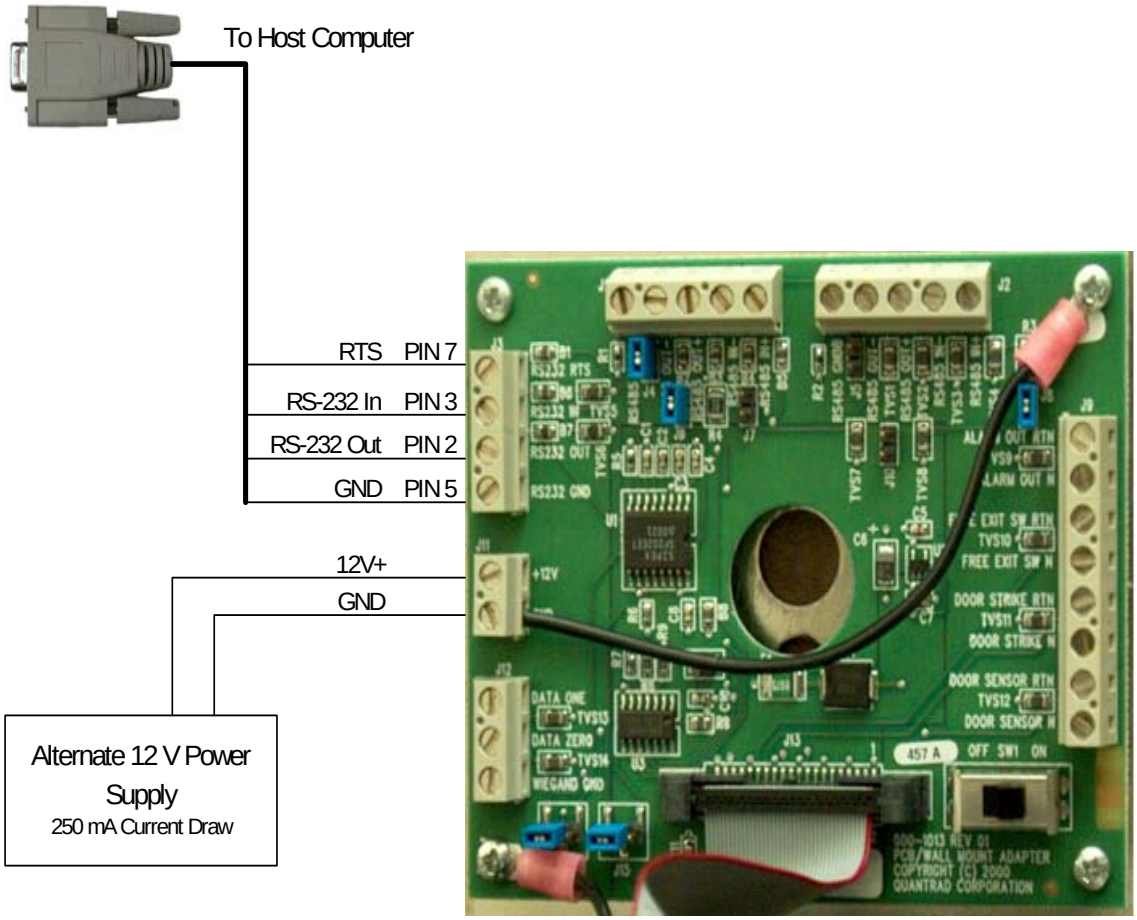
Philips Electronics Standard

- Contactless MIFARE smart card (1-KByte/8-Kbit)
- Contactless MIFARE smart card (4-KByte/32-Kbit)

HID Corp.

- 13.56 MHz MIFARE and 125 kHz Proximity contactless smart card (1-KByte/8-Kbit)

CombiSmart reader wiring



Inside panel of the CombiSmart Reader

You will need the Enrollment Kit to configure the reader. The Enrollment and Encryption keys have already been downloaded to the reader. There is a possibility that you will have to upgrade the firmware.

CombiSmart/GuardDog Configuration

Note: To configure the CombiSmart/GuardDog reader, the Admin.exe program must be taken off the Supplemental disc and installed in the same access control Program File folder.

1. Run the Admin.exe program from the OnGuard Program File folder.
2. When prompted for the password, enter `prokupets`.
3. Ping the port to verify the connection.
4. Click [Enumerate]. The unit will run through a series of tests. Upon completion, it will state, “Found 1 Unit, Combi ID #1.”
5. Set the time and date. Click [Get] to retrieve the current time from the host workstation or click [Set] to program the time/date into the unit.
6. The Command Mode should be set to “Directed.”
7. On the Configuration tab, click [Load].
8. Navigate to the file, LnlConfiguration.qcp located on the Supplemental disc.
9. Click [Download] to load the configuration files.
10. After the unit has been programmed, “Verification passed” will be displayed at the bottom.

97.2 Configuring Enrollment Readers

Be sure to select the correct COM port to which the reader is connected. You will also need to set up the card format for these readers and assign them to an active badge type.

Reader type	Card technology	Card format type
CombiSmart	Contact Smart Chip	Smart card
GuardDog	MIFARE	Smart card

97.3 Encoding Smart Cards

The CombiSmart and GuardDog readers can be used to encode cardholder data to a smart card. In order to encode smart cards, System Administration must be used for proper configuration.

1. Create the appropriate smart card format.
2. In the **Badge Types** folder, under the **Encoding** form, add the card format to be encoded.
3. In the **Workstations** folder, under the **Encoders/Scanners** form, add the reader being used to encode the smart card.

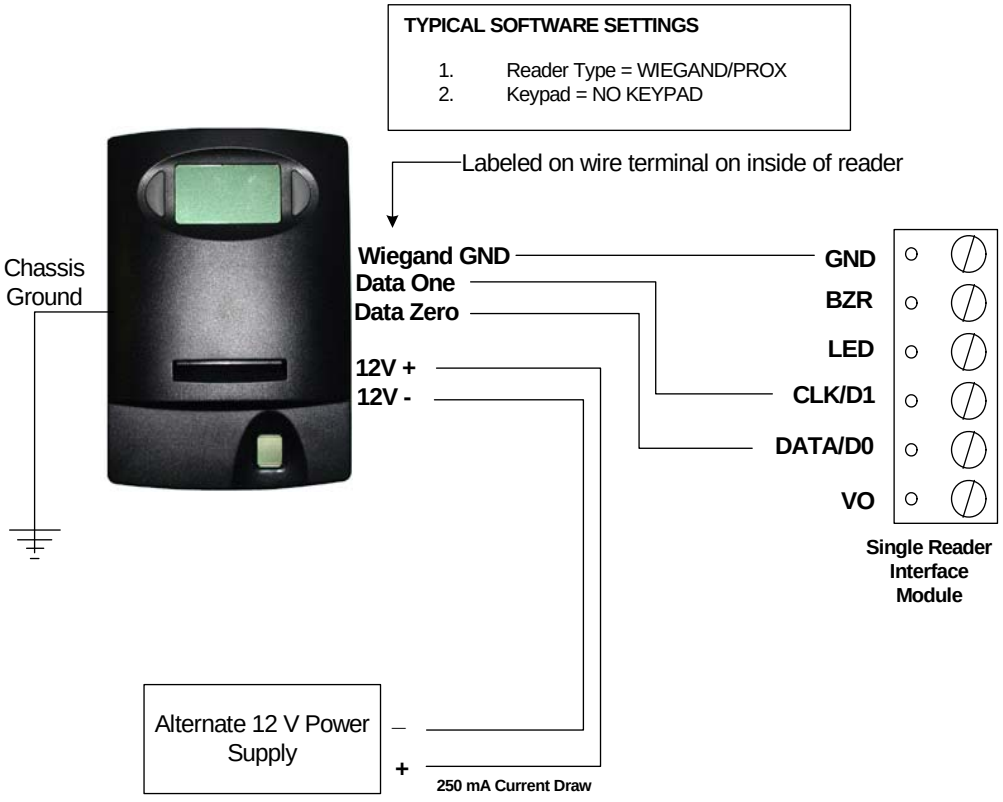
Note: For more information, refer to the System Administration User Guide.

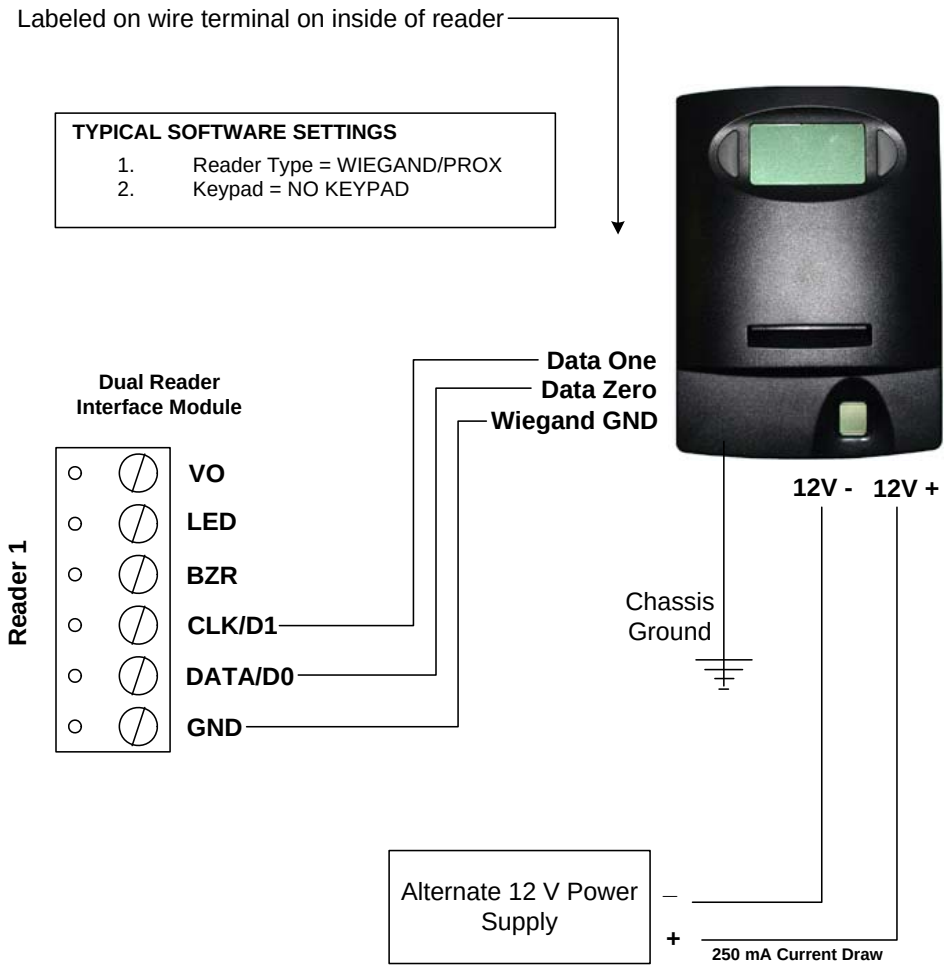
98 Verification Readers

Biocentric Solutions GuardDog and CombiSmart readers are used as access readers. They interface with the Reader Interface Module (LNL-1300 or LNL-1320). Use the following diagrams to connect them properly.

98.1 Wiring CombiSmart Readers

CombiSmart Reader Voltage: 12 VDC 0.25A





98.1.1 CombiSmart Reader Configuration

The configuration which supports OnGuard integration with the reader is stored in the file, LenelConfiguration.qcp. It is loaded on the device by the manufacturer.

Note: All readers supplied by Lenel are already configured and ready for installation.

The configuration can be downloaded to the specified Combi device(s) with Admin.exe provided by Lenel. You can find this on the Supplemental disc of the OnGuard disc set, under the BiocentricSolutions directory.

For configuration, the CombiSmart reader must be hooked up to the workstation via RS-232.

Note: These devices will accept only software distributed by Lenel and configuration records digitally signed with the distributor key.

Configuration tab

Use the Date/Time area on the Configuration tab to set the date and time for the specified Combi-device. Ordinarily, the entry fields contain the system date and time for the system on which Setup is running. You can use the scroll buttons to modify the date and time. Pressing *Set* downloads the new date and time to the Combi-device.

Note: Other values should NOT be changed.

98.1.2 CombiSmart Reader Operation

Power Up Sequence

When power is applied to a Combi-device, the unit performs an internal self-test and initialization procedure. When initialization completes, INSERT CARD is displayed.

Standard Operation

When the unit is in the ready state (INSERT CARD is displayed), a user inserts an ID card into the card slot.

For a CombiSmart reader, the card must be inserted with the chip facing the bottom of the Combi-device.

Once the Combi-device successfully reads the card, it displays the PLEASE PLACE FINGER ON THE SENSOR message. The operator must use a finger that was used during the enrollment process and encoded on the identification card.

The user should ensure that the finger touches both the finger guide and the sensor material and that the finger is not placed at an angle to the sensor.

Once the sensor detects the finger, a SCANNING… message appears. The user should not move the finger until the PROCESSING… REMOVE FINGER message appears.

When the unit confirms that the fingerprint image matches the information encoded on the identification card, it displays the ID VERIFIED message, along with the user's name as encoded on the ID card. (Note: The second line can be changed by the application, so something other than the user's name may be displayed.)

At this point the unit will beep three times, log the appropriate information, and provide a pre-configured external validation signal (for example, a signal that causes a door to open). The unit then returns to the ready state.

Button Operation

The programmable buttons located on either side of the status light are enabled after the unit has completed the power up initialization and is in the ready state.

Right Button – Pressing the right button causes the Combi-device to reread the card.

Left Button – Pressing the left button displays the Combi-device software version information.

Both Buttons – Pressing both buttons simultaneously resets the Combi-device.

Normal Error Conditions

The following errors occur during normal use of the reader. Often, the end user can take an action that corrects the situation. If the user action is unsuccessful, the user should notify the system administrator for assistance. If the system administrator cannot resolve the problem, he or she will generally call for authorized service.

Error Display	Probable Cause	Corrective Actions
CARD NOT READ REINSERT CARD This message is displayed for several seconds before the PLEASE REMOVE CARD message appears.[1]	• Card not inserted with proper orientation • Card not fully seated • Card is dirty or damaged • For a CombiReader, the ambient light level is too high • Card not yet enrolled • Card was enrolled in a different system	• If using a CombiReader, make sure the card is clean and the patch faces the device. If ambient light level is high, try shading the reader with your hand. • Ensure the card is fully seated. • Inspect the card for damage. • Correct any problem and reinsert the card. • If the error still appears, call the System Administrator.
NO FINGER DETECTED PLACE FINGER ON UNIT This message is displayed three times or until a finger is detected. If a finger is not detected after three tries, the PLEASE REMOVE CARD message appears.[2]	The Combi-device did not detect a finger. This can be caused by: • Finger not properly placed • Dirty sensor material • Fingerprint sensor failure	• Repeat the process with proper finger placement. • Clean the sensor. • If the error still appears, call the System Administrator.
ID NOT VERIFIED This message is displayed when the maximum number of print verification attempts have failed.[2] It displays for 3 seconds before the PLEASE REMOVE CARD message appears.[1]	The Combi-device could not verify the identity of the user. This can be caused by: - Finger not properly placed - Finger too dry or damp - Wrong finger placed on sensor - Dirty sensor material - Fingerprint sensor failure	• Repeat the process with proper finger placement. • If your finger is dry, try applying lotion. If it is damp, dry it and try again. • Ensure that the same finger was used as was used for enrollment. • Clean the sensor. • If the error still appears, contact the System Administrator.
DOOR OPEN ALARM CLOSE DOOR	The door has been left open for longer than the configured time.[3]	Close the door.

Error Display	Probable Cause	Corrective Actions
1. The time delay between the current message and the next message is part of system configuration and is specified in seconds. 2. The number of finger print match attempts is part of system configuration. The default is 3. 3. The door open delay time is specified in seconds and is part of system configuration.		

Abnormal Error Conditions

The following table details error conditions and messages that may be encountered and that indicate an abnormal error. Generally, end users will not see these errors. If they do, they should be instructed to contact their system administrator. Each error indication also lists a probable cause and actions that might correct the problem.

Error Display	Probable Cause	Corrective Actions
SYSTEM REQUIRES CONFIGURATION	The device's security level is not set.	Set the device configuration values.
UNAUTHORIZED ACCESS AT THIS STATION	The security level encoded on the card is not valid for this unit.	Update the user's card, if appropriate.
INVALID SECURITY KEY	The card is not valid at this reader. Generally, the security key identifies the company. That means the user is attempting access with a card from another company.	Update the user's card, if appropriate.
UNEXPECTED FORMAT ID NOT VERIFIED	This card is not in a format that can be read by your system.	Update the user's card, if appropriate.
ERROR INITIALIZING FPM DEVICE	An error occurred while the device was being powered up. The device is not operational.	Retry device initialization. If the error still occurs, call for service.
RESETTING PLEASE WAIT…	This is a device initialization message and should appear only briefly during power up or after both buttons have been pressed to reset the device. If it is displayed long enough to be seen, the device is probably locked up.	Power off and restart the device.

98.2 Wiring GuardDog Readers for Verification

The wall-mounted unit can be used for access verification. A reader interface module is required for connection.

Connect the wires of the GuardDog to the reader interface module according to the following table.

Color	Connection
Black	GND
Brown	Power +12 VDC
Red	Digital input
Orange	RS-232 TxD/RS-485 Data +
Yellow	RS-232 RxD/RS-485 Data -
Green	Wiegand zero
Blue	Wiegand one
White	GND

98.2.1 GuardDog Reader Operation

The contactless GuardDog, similar to the CombiSmart reader, operates with a MIFARE contactless smart card, which is the industry standard. This card complies with ISO 14443A. For more detailed information, please refer to the GuardDog documentation.

To use the contactless GuardDog for authentication:

1. Hold the smart card close to the top of the GuardDog. The card must be 4 cm (2 inches) or closer. The LED turns amber when the GuardDog is reading the card.
2. After the “chirp” and when the Fingerprint Sensor LED is blinking green, place your finger on the sensor. The LED turns amber when the GuardDog is scanning your finger.
3. After the chirp and when the LED turns off, remove your finger.
    - The GuardDog emits three very quick chirps and both LEDs blink green to indicate that you have been successfully verified.
    - If the GuardDog emits only a single chirp and the Fingerprint Sensor LED starts to blink green again, the GuardDog was unable to verify you. Reposition your finger and repeat step 3. If, after three tries, the GuardDog cannot make a verification, both LEDs blink red and the unit emits three long beeps.

99 Maintenance

The Biocentric Solutions devices are designed for operation within facilities that may or may not be air-conditioned. They should be protected from environmental extremes.

The fingerprint sensor needs to be protected from getting excessively wet. While the water will not damage the sensor or Combi, excessive moisture can interfere with the Combi's ability to authenticate a fingerprint.

In addition to the specifications below, you also want to consider the available light where the unit will be placed. Avoid areas where bright sunlight or other lighting will shine directly on the unit—this makes the LCD difficult to read.

Regular cleaning can help prevent authentication failures. The fingerprint sensor, in particular, should be regularly cleaned because dirt, dust, and other grime on the sensor can interfere with fingerprint imaging. Use a damp cloth to remove loose dirt and dust from the external surfaces of the Combi. Use a cotton swab and rubbing alcohol to clean the card slot. Use a cotton wipe and rubbing alcohol to clean the fingerprint sensor. Use a cotton wipe and rubbing alcohol to clean the display.

99.1 Tips and Tricks

Accurate enrollment is important and has a direct impact on verification. There are trade-offs between security and false acceptance and false rejection rates.

99.1.1 Ensuring Accurate Enrollment and Fast Verification

The quality of the enrollment data (biometric templates) affects the success and failure rates of verification. High quality data helps ensure that legitimate users are accepted and impostors are rejected. Low quality data leads to more false rejections. Because of the importance of the quality of the data, allow enough time to capture multiple prints from an enrollee so you can select the ones with the highest quality.

Train the enrollees on proper finger placement and let them practice a few times. Dissimilar finger placement is one of the biggest factors in verification failures, so make sure the enrollee can be verified on the enrollment reader. Allowing the enrollee to practice also tests the template and makes sure the data was properly written to it.

If an enrollee cannot be verified after several tries, re-enroll him or her. If the individual has problems with the enrollment or practice reader, he or she will also have problems with other access readers.

Common Problems and Solutions

Most verification failures occur because of the following:

- Finger positioned incorrectly
- Finger moved during reading
- Pressing too heavily or lightly
- Wrong finger - using one that doesn't have a template stored
- Finger too wet or dry (You may want to include towels and hand lotion in your enrollment station supplies.)
- Cut finger or otherwise changed

All these problems are easily solved or avoided with proper training during enrollment and capturing quality prints from more than one finger or thumb.

99.1.2 Finger Selection and Placement Tips

If an individual's thumbs have good prints, use his or her left and right thumbs for enrollment. (It's easier for someone to remember to use a thumb rather than one of eight fingers.) For example, if the enrollee is right handed, acquire two images from his or her right thumb and one from the left. Refer to the next section for determining if a thumb print has acceptable quality.

For each enrollee, always capture prints from more than one finger or thumb, and preferably at least one from each hand. By using multiple fingers or thumbs, the enrollee has a backup in case he or she is injured and can't use the usual finger for verification.

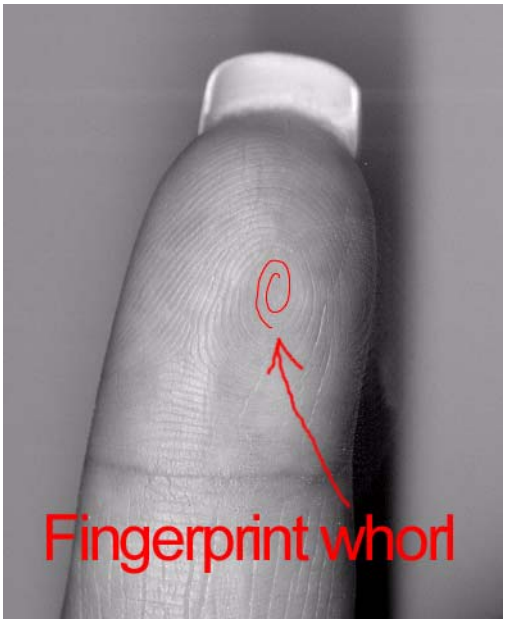
The enrollee should place his or her finger or thumb on the sensor so the cuticle is about in the center of the sensor.

An enrollee's finger or thumb should:

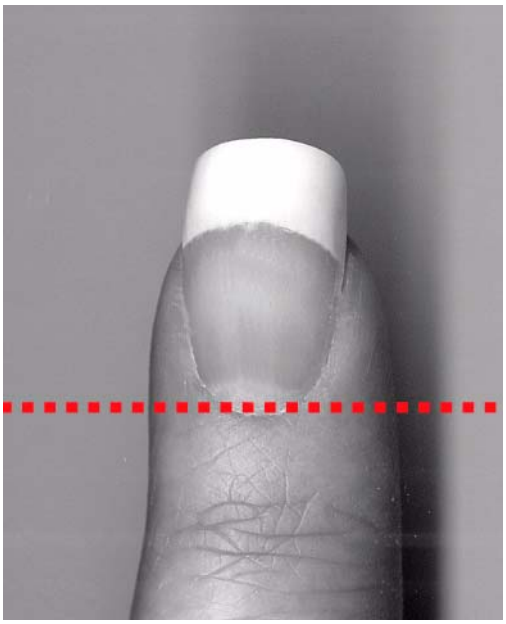
- Lie flat on the sensor
- Cover the entire sensor area so it is touching the edges of the sensor area (individuals with small fingers should use thumbs if at all possible)
- Be parallel to the sensor's sides
- Be placed so the cuticle is aligned with center of the sensor
- Not be wet
- Not be moved during scanning

New enrollees tend to position their fingers too low with the tip of the finger touching the top of the sensor. The top of the finger should be above the sensor and touching the plastic inset of the reader.

The whorl should be located in the center of the fingerprint.



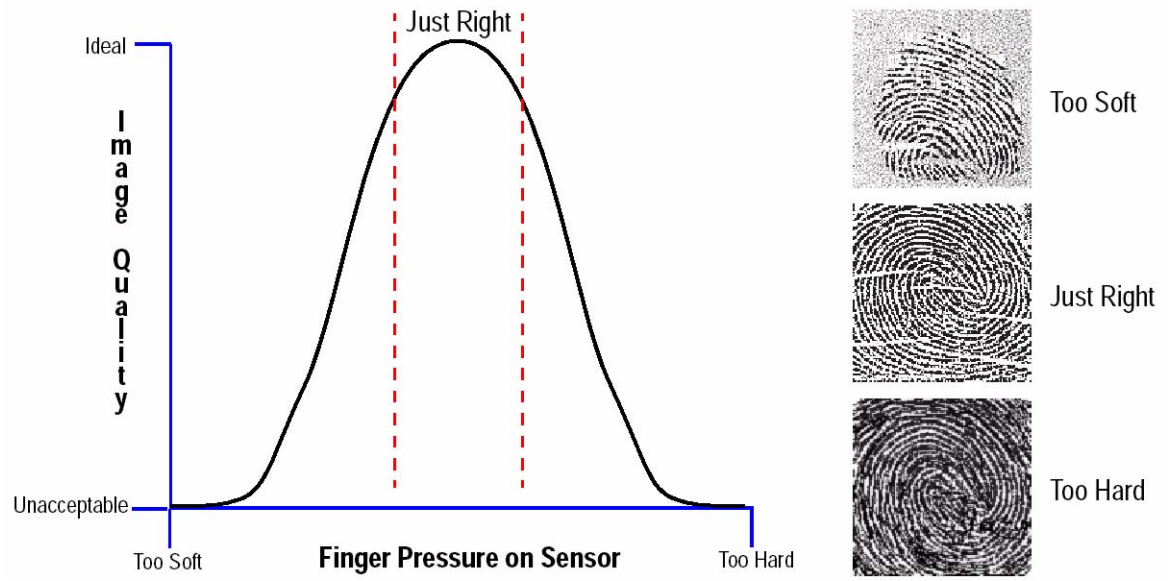
Line the cuticle up with the center of the inset.



99.1.3 Fingerprint Pressure

Pressure too, affects the quality of a fingerprint image. When positioning a finger or thumb on the sensor, some pressure needs to be applied but not so the fingerprint is flattened and can't be scanned. The following figure illustrates the relationship between pressure and its effects on the fingerprint image.

Pressure effects on fingerprint images

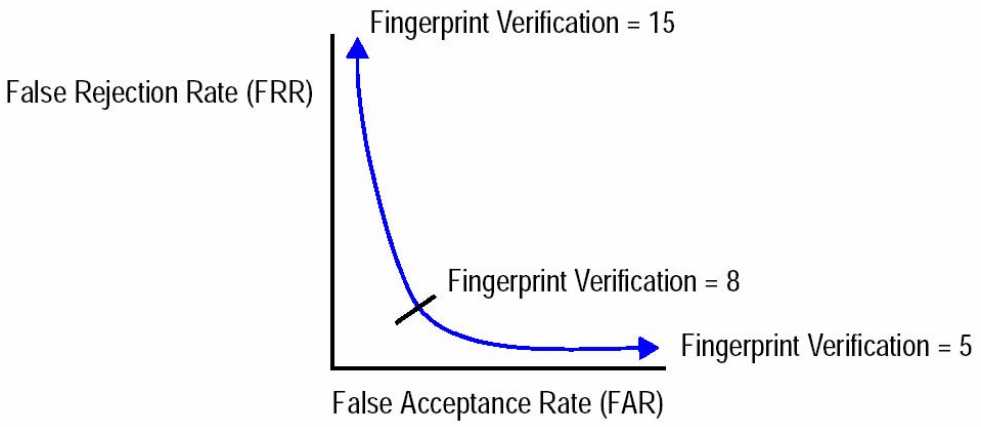


99.1.4 Trade-offs

Two measurements, False Acceptance Rate (FAR) and False Rejection Rate (FRR), are often referred to in biometric systems. The first, FAR, refers to the number of times a person who is not enrolled is accepted by the system. The second, FRR, refers to the number of times a person who is enrolled is rejected by the system.

Typically, the more secure a system is, the higher the FRR—more people are rejected who shouldn't be. You can lower the FRR but you will also lower the security of the system by increasing the FAR — more people are accepted who shouldn't be.

Relationship between the threshold parameter setting and the FRR and FAR


Fingerprint Verification = 15
False Rejection Rate (FRR)
Fingerprint Verification = 8
Fingerprint Verification = 5
False Acceptance Rate (FAR)

You may want to experiment with the various settings to help you determine what the optimal threshold should be for the application.

99.1.5 Specifications

The following specifications are generally for most readers. Please refer to your manufacturer owner's manual for more detailed information.

Note: These specifications are subject to change without notice.

CombiSmart

- Mechanical:
  - Height: 7.5 in (19.05 cm)
  - Width: 5.5 in (13.97 cm)
  - Depth: 4.65 in, wall mounted (11.81 cm)
  - Weight: 2.5 lbs. (1.134 kg)
- Primary Power:
  - DC input: 12 VDC (250 mA)

The reader operates from externally supplied DC power of 12 VDC (8 - 16 VDC), regulated with a maximum ripple of 50 mV p-p. Under worst-case conditions, the reader should not require more than 10.0 watts.

For wall-mounted devices, the power, along with all other wiring, is connected through a cable port in the wall mount. For desktop devices, power is provided by a 12VDC adaptor that plugs into any standard receptacle and connects directly to the Combi-device.

- Memory and Clock Backup:

  Not applicable

- Environmental:

  Temperature: Operating: 5° to +45° C; Storage -20° to 70° C

  Humidity: 0 to 90% RHNC

  Altitude: Operating: between sea level and 10,000 feet; Storage: between sea level and 50,000 feet

GuardDog

- Mechanical:

  Height: 4.38 in (11.11 cm)

  Width: 2.63 in (6.67 cm)

  Depth: 1.25 in, wall mounted (3.17 cm)

  Weight: less than 1 lb. (0.45 kg)

- Primary Power:

  DC input: 12 VDC (250 mA)

- Digital Interface Signals
  - Selectable RS-232, RS-485 half duplex (default).
  - RS-232
    - 38400 baud
    - Complies with EIA/TIA-232E, V.28 specification
    - Recommended maximum cable length is 15 m (about 50 feet)
  - RS-485
    - 38400 baud
    - Maximum of 32 units on each RS-485 network
    - Recommended maximum cable length is 1219 m (about 4000 feet)
  - Wiegand Serial Data Output (Wall-Mount Only)
    - 26-bit standard (others available on request)
    - 50 mA maximum output current drive (output low)
    - Recommended maximum cable length is 15 m (about 50 feet)

- Environmental:

  Temperature: Operating: -20° to 70° C; Storage -20° to 70° C

  Humidity: 0 to 90% RHNC

- Altitude: Operating: between sea level and 10,000 feet; Storage: between sea level and 50,000 feet

BIOSCRYPT READERS

100 Overview

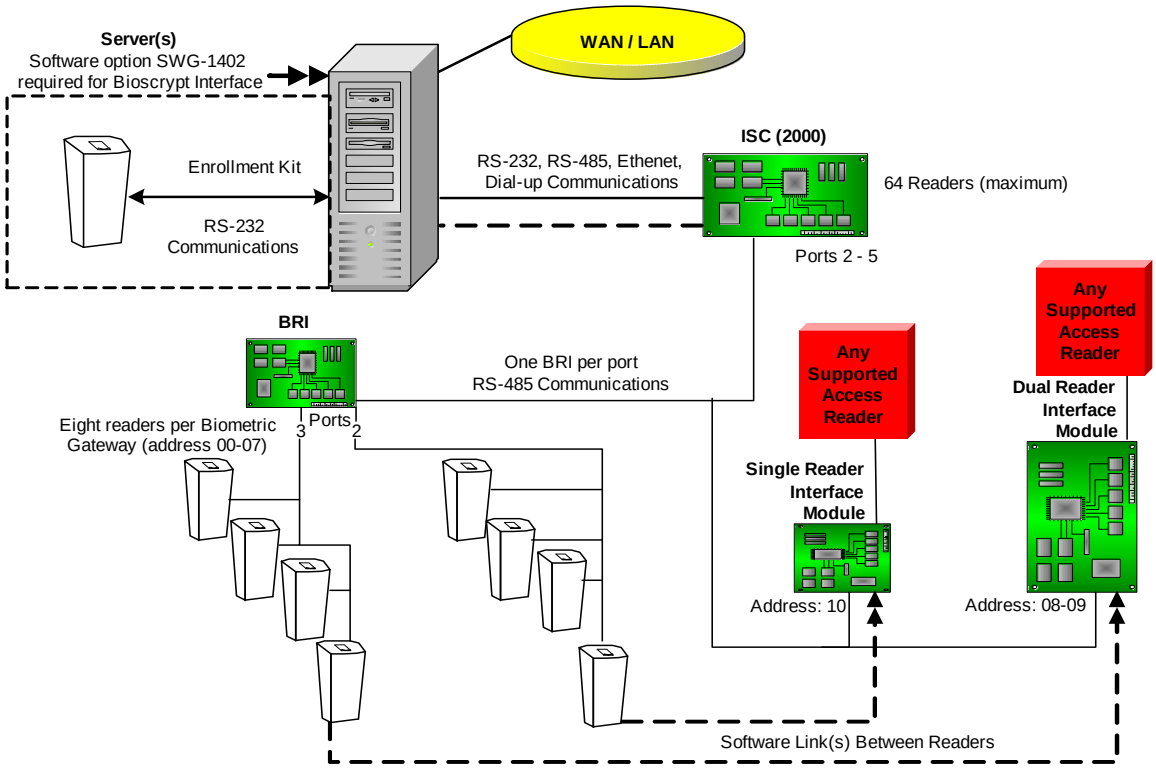
This installation guide is intended for use by technicians who will be installing and maintaining the OnGuard system with Bioscrypt readers.

100.1 V-Pass FX and V-StationA

The V-Pass FX is a fingerprint reader. To use this reader, it must be configured as an alternate reader and linked (through the software) to a primary reader. This is necessary for door control. Controller-based templates are used, so verification occurs through comparing the fingerprint with the biometric data (called a template) stored on the ISC.

V-Pass FX readers interface upstream with the Biometric Reader Interface Gateway (LNL-500B). It can also interface with the intelligent dual reader controller (LNL-2220) or series 2 reader interface modules (LNL-1300, LNL-1320). Multiple V-Series devices may be connected in a single network.

Communications overview for the V-Pass FX readers using the biometric reader interface gateway

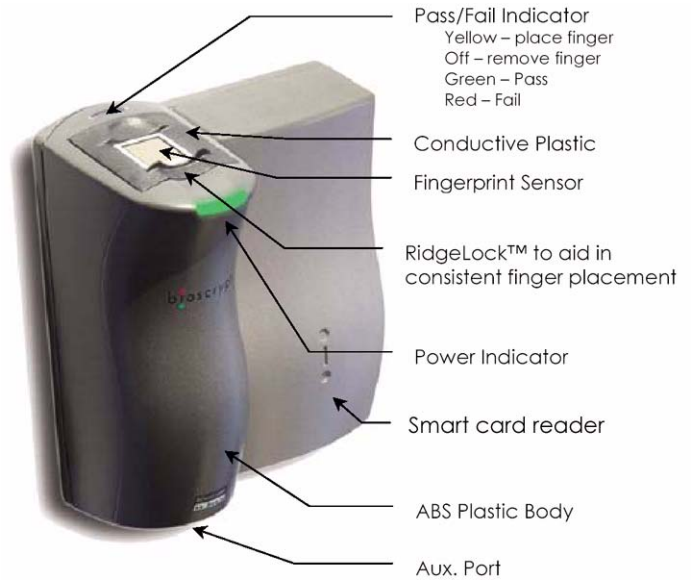


The V-StationA has a fingerprint reader as well as a keypad. Like the V-Pass FX, it also uses controller-based templates. This model does not have a smart card reader.

100.2 V-Smart and V-StationG/H

The V-Smart has a fingerprint reader as well as a contactless smart card reader (MIFARE or HID iCLASS model R10). The V-SmartA-G reader is for MIFARE; the V-SmartA-H reader is for HID iCLASS.

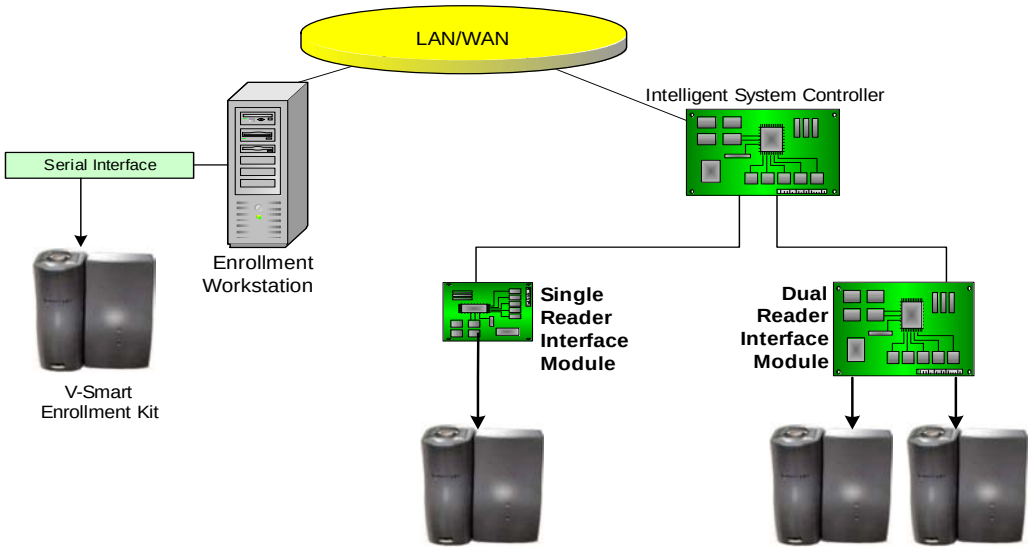
Standard V-Smart reader



The V-Smart access readers interface upstream with the reader interface module (LNL-1300, 1320) as well as the intelligent dual reader controller (LNL-2220). These readers use card-based templates. They verify the identity of an individual by scanning his or her actual fingerprint and comparing the scanned print with fingerprint data stored on a smart card. The readers use a smart card to provide the highest level of security and functionality. This is also true of V-StationA-G and V-StationA-H readers.

The V-StationA-G (MIFARE) and V-StationA-H (iCLASS) have capabilities for reading smart card and fingerprint verification. The keypad on this unit is reserved for future use.

Communications overview for the V-Smart/V-Station (G/H) readers



101 Installation

Use the following information to install V-series readers (for either enrollment or access verification). For these readers to function with OnGuard, software option SWG-1402 is required.

101.1 Reader Power Requirements

The Bioscrypt readers (V-Smart, V-Pass FX, V-Station) require an Earth ground connection to dissipate ESD (electrostatic discharge).

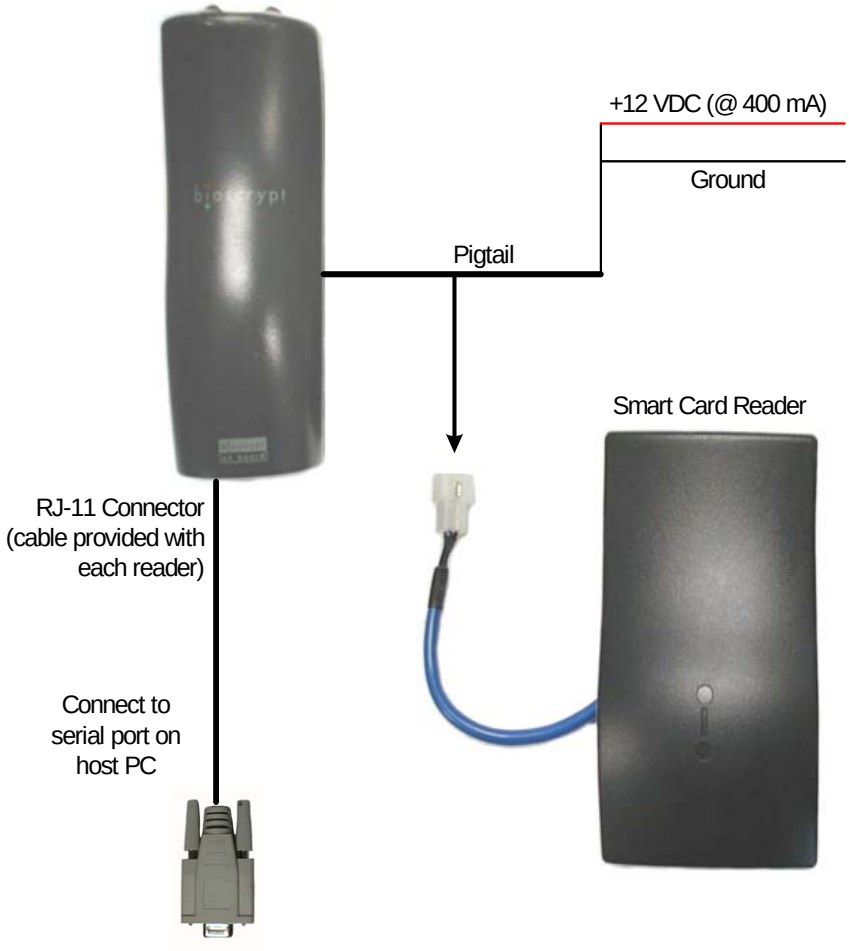
Important: Do not use power ground as a substitute for Earth ground.

Sensor damage is often a result of ESD. Be sure that every unit that is installed has a connection to Earth ground using pin 15 of the pigtail. Pin 15 should be connected to an Earth ground such as a cold water copper pipe or building ground using a 14-18 AWG single conductor. In addition to the Earth ground connection, the ridge-lock should be used consistently during finger placement to ensure a safe path to discharge the electrostatic. The sensor should NOT be the first point of contact.

101.2 Enrollment Readers

At least one V-series reader must be configured for use as an enrollment reader for biometric information for cardholders. The primary communications port is wired through the pigtail in the rear of the unit. An auxiliary RS-232 port is located at the bottom of the unit. The serial cable is included with the reader (part number B440-0002-00). For more detailed information, refer to the V-Series manual.

Connection of enrollment reader (using V-Smart)



1. Using the cable included with the reader, plug the RJ-11 connector into the aux port on the reader.
2. Plug the serial connector into a free port on the host PC.

The reader will then have to be configured. For more information, refer to Reader Configuration on page 524.

101.2.1 Reader Configuration

The computer to which the V-Series reader is connected will be used to configure the reader. This computer must have VeriAdmin software. This software is included on a disc which comes with the reader. It can also be obtained from the Supplemental disc or from the manufacturer web site (www.bioscrypt.com). Enrollment is done through the Multimedia Capture Module.

101.2.2 Firmware

If there are encoded cards that previously existed for this particular build and the fingerprint template is configured to default to global security during capture, these cards will have to be re-encoded. Set the template security level to a configuration other than “Default to Global Security” for re-encoding. Capturing new templates is not necessary.

The template security level may be set to “Default to Global Security.”

The readers should be running firmware version 7.61 or later. It will take several (at least 15) minutes to complete this process. Firmware should be updated before configuring the settings for the reader.

1. Open the VeriAdmin.exe application.
2. Select **Configure > Update Firmware > Update Veri-Series Firmware**.
3. Then select **Configure> Update Firmware > Update ESI Firmware**.

Note: The Biometric Mismatch capability requires Veri-Series firmware version 7.61 and VeriAdmin version 5.4 or later.

101.3 V-Pass FX

Bioscrypt V-Pass FX and standard V-StationA readers should be connected to the LNL-500B, series 2 LNL-1300 or LNL-1320, or LNL-2220 (RS-485 2-wire multi-drop).

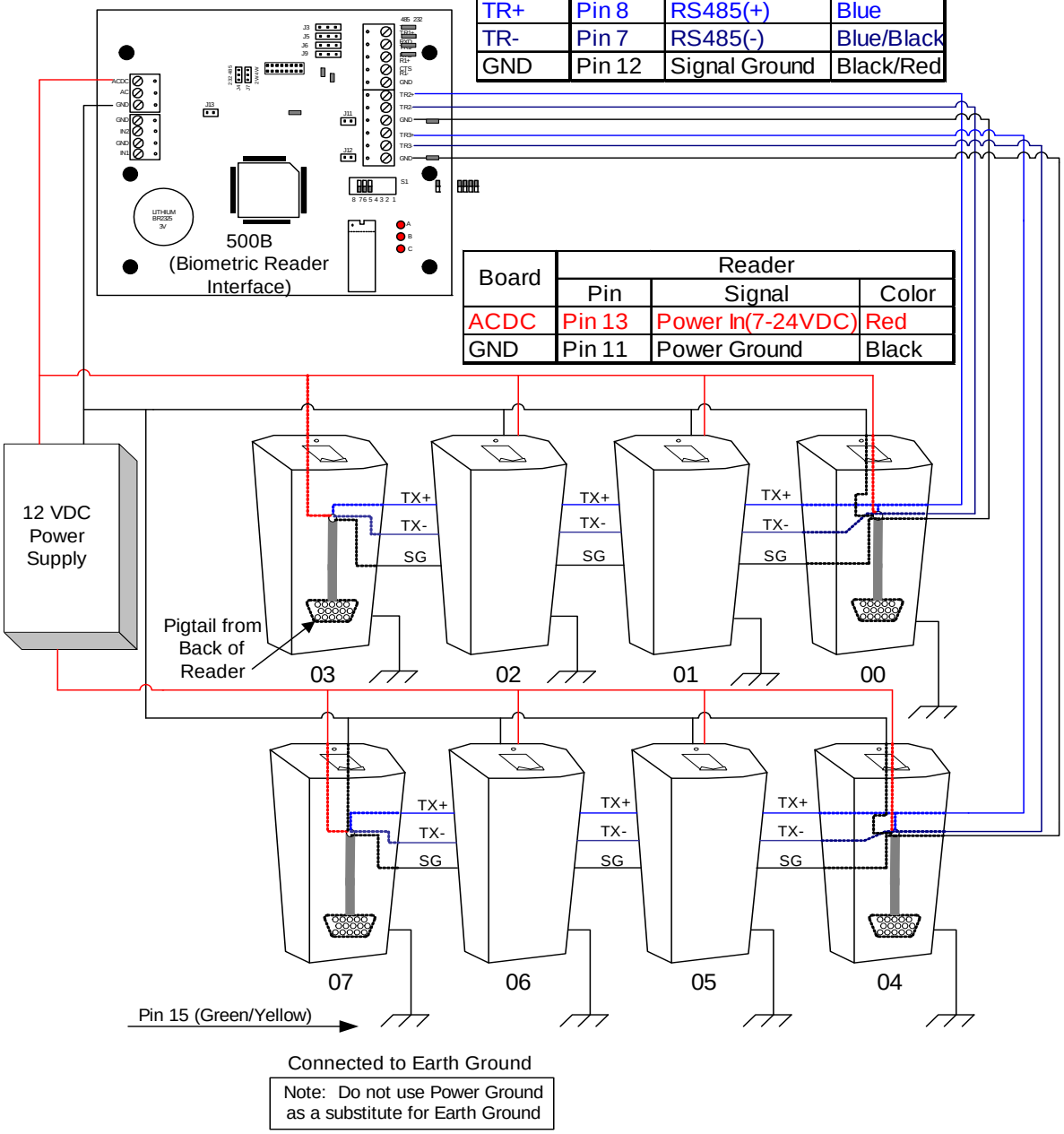
The use of the series 2 reader interface modules LNL-1300/1320 requires OnGuard 5.12.012 or higher. The use of the intelligent dual reader controller LNL-2220 requires OnGuard 5.12.110 or higher.

The V-Pass FX requires driver software MV1610 version 9.20 as well as VeriAdmin Management software version 7.40. It operates at 9-24 VDC with an average current draw of 200mA, 400mA peak. The reader must be powered by an external power supply with a common ground to the reader interface.

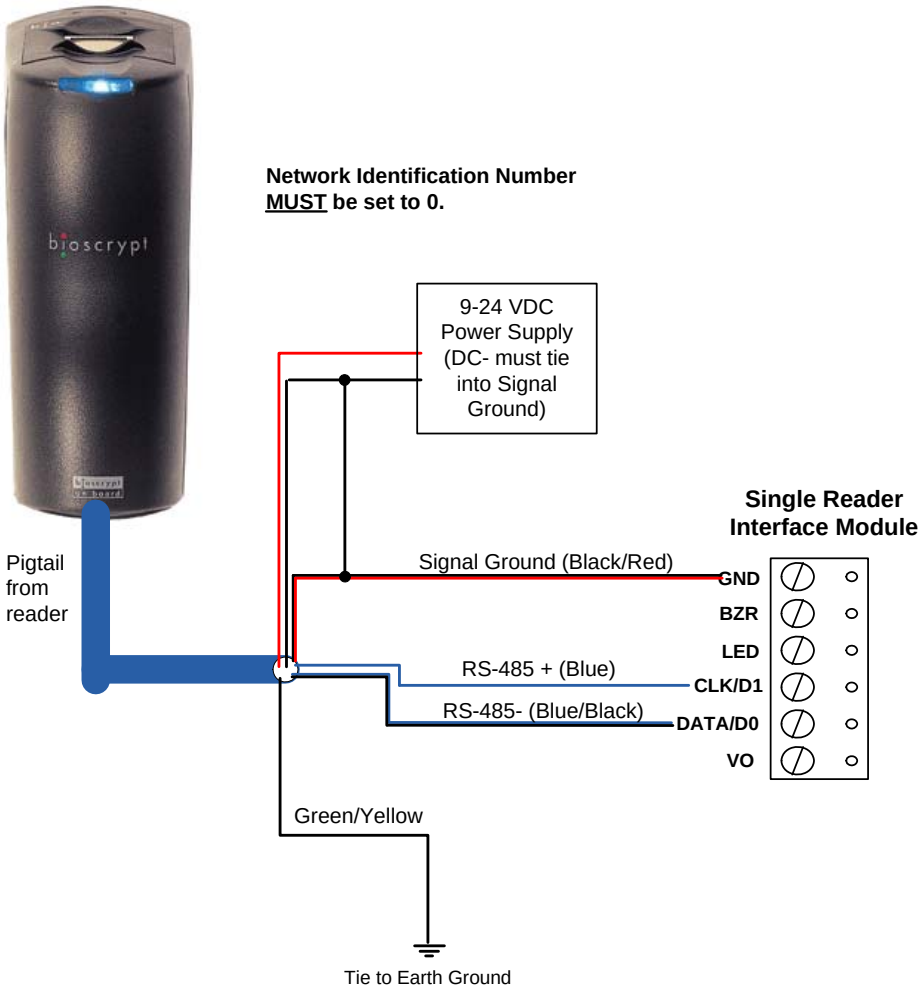
Wiring of V-Pass FX readers with LNL-500B

Board	Reader		
	Pin	Signal	Color
TR+	Pin 8	RS485(+)	Blue
TR-	Pin 7	RS485(-)	Blue/Black
GND	Pin 12	Signal Ground	Black/Red

Board	Reader		
	Pin	Signal	Color
ACDC	Pin 13	Power In(7-24VDC)	Red
GND	Pin 11	Power Ground	Black



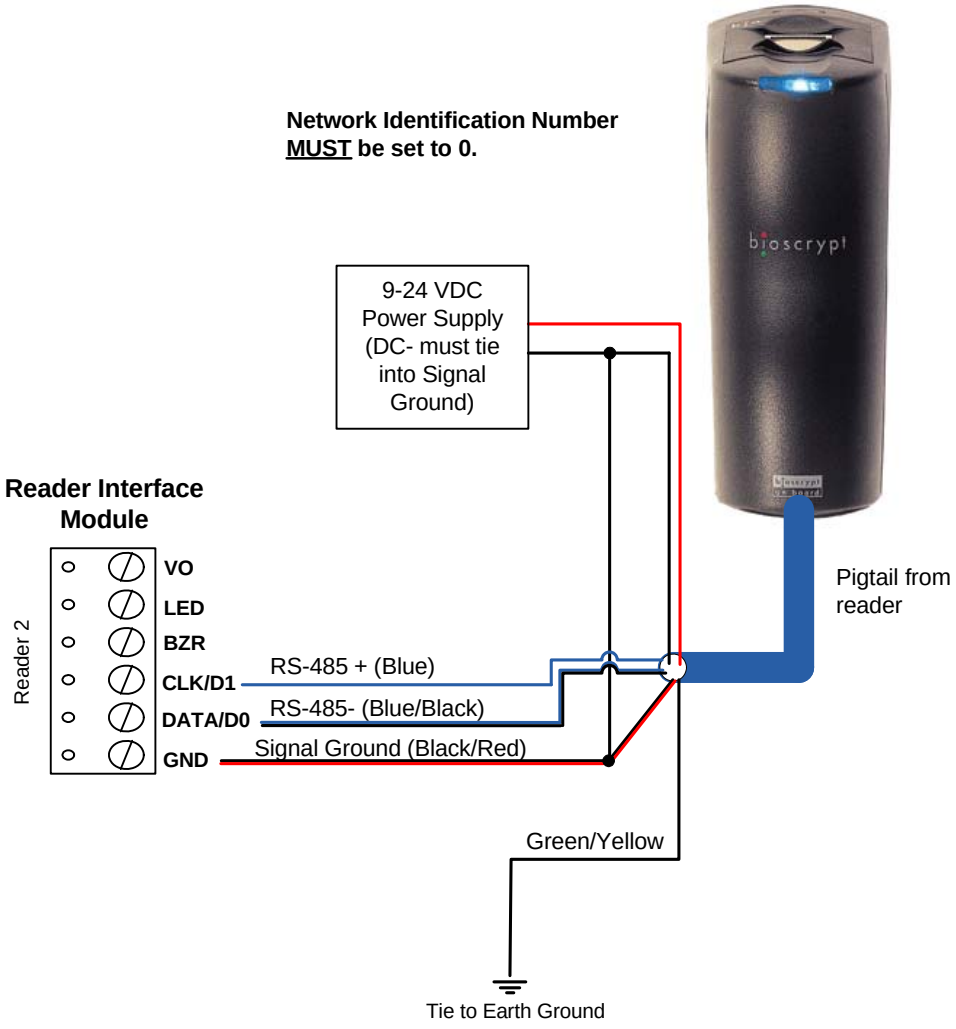
Wiring of V-Pass FX with Series 2 LNL-1300



TYPICAL SOFTWARE SETTINGS
(Note: Software version 5.12.12 or higher required for Series 2 single reader interface module.)

1. Reader Type = (Bioscrypt RS-485)

Wiring of V-Pass FX with LNL-2220 or Series 2 LNL-1320



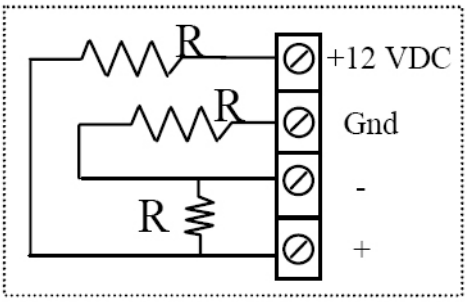
TYPICAL SOFTWARE SETTINGS
(Note: Software version 5.12.12 or higher required for Series 2 dual reader interface module. Software version 5.12.110 or higher required for intelligent dual reader controller.)

1. Reader Type = (Bioscrypt RS-485)

101.3.1 Termination

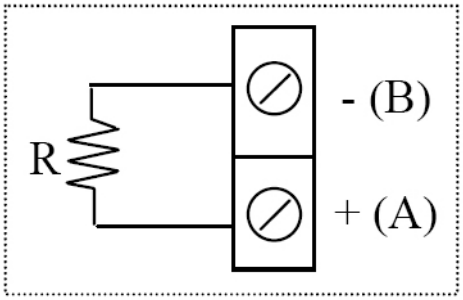
RS-485 supports distances of up to 4000 feet (1219 m) and/or 31 readers. Typically, no end-of-line termination is required unless the total run exceeds 2000 feet.

It is recommended that the RS-485 transmission line be terminated at both ends. The recommended termination at the PC end of the line is called fail-safe termination.



This terminator ensures that there is a proper bias voltage across the receiver inputs. This, in turn, ensures that the receiver is in a known state and puts less of a strain on the driver to provide that bias. This termination is typically built into the RS-232/RS-485 converters and internal PC add-on boards – you should confirm that such a termination exists, but you likely don't have to supply it yourself.

The termination at the opposite end of the transmission line should be parallel (or passive) termination.

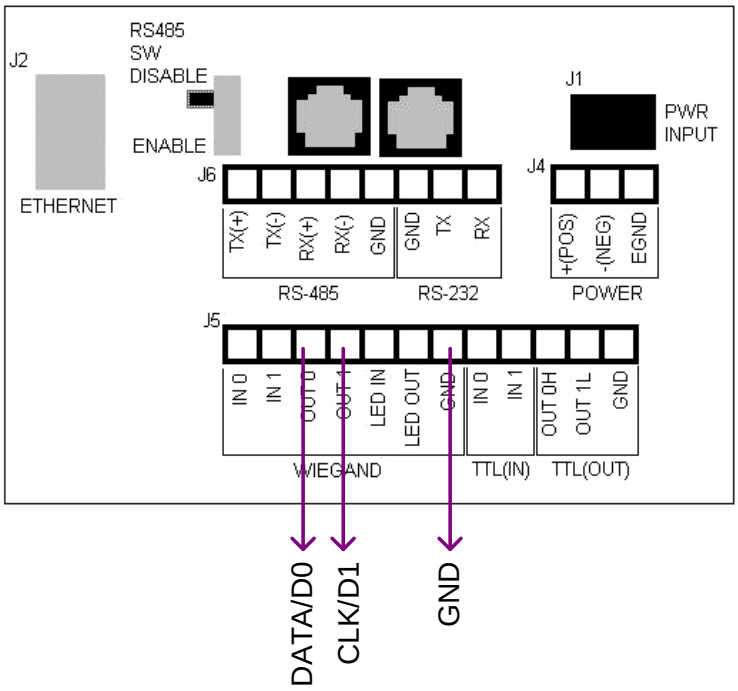


The value of R in the figure is chosen to correspond to a proper parallel termination, RT, and it is chosen to be slightly larger than the characteristic impedance of the cable, ZO. Over-termination tends to be more desirable than under-termination since over-termination has been observed to improve signal quality. RT is typically chosen to be equal to ZO. When over-termination is used RT is typically chosen to be up to 10% larger than ZO. The elimination of reflections permits higher data rates over longer cable lengths.

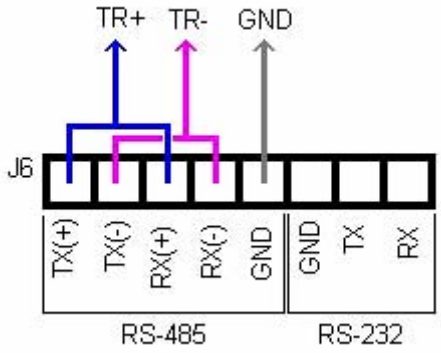
101.4 V-StationA

Communication between the V-StationA reader and the LNL-500B/1300/1320/2220 is done via RS-485 connection. Wire power separately.

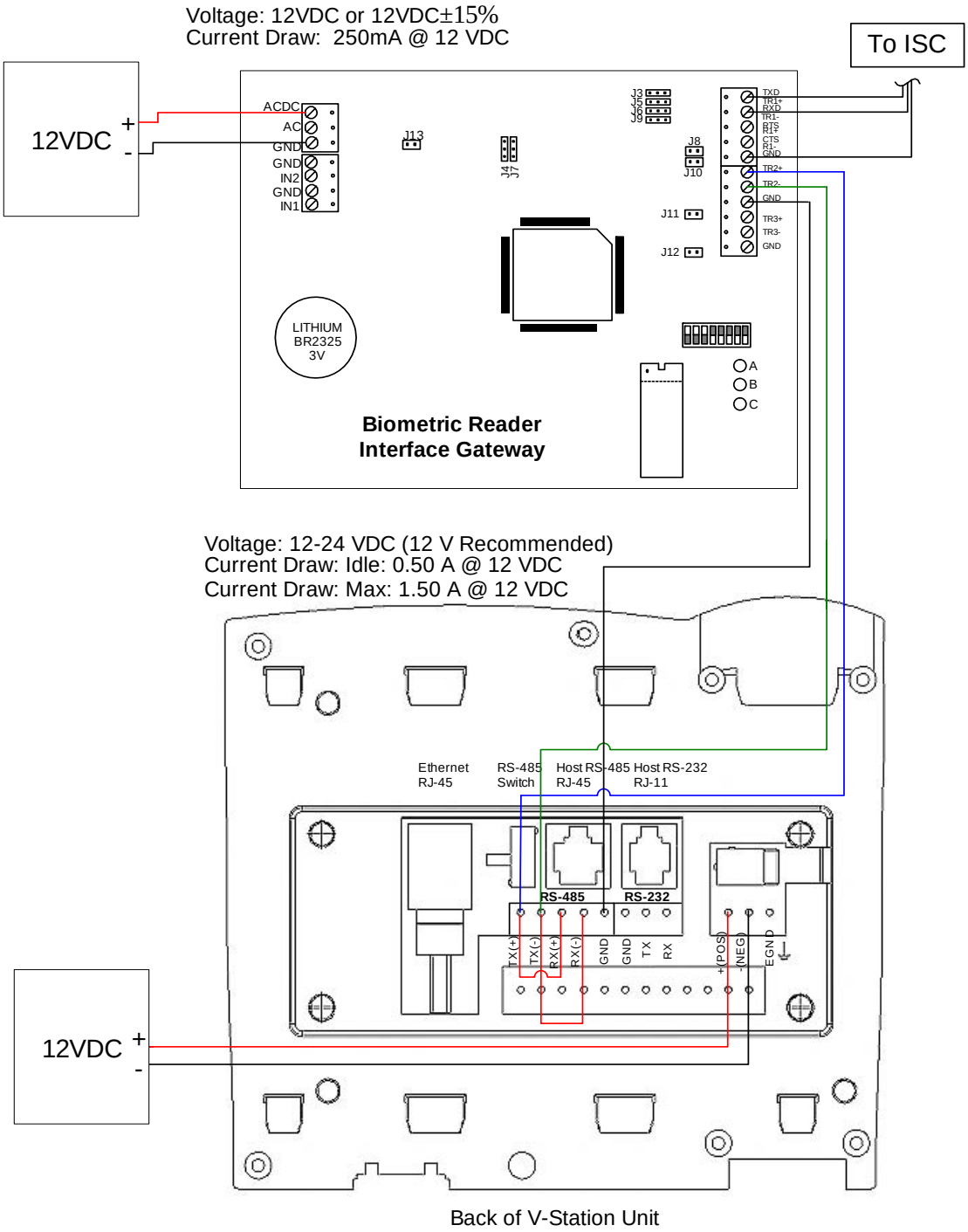
V-StationA unit with connections to reader interface (LNL-1300, 1320, or 2220)



On the back of the unit, jumper TX(+) and RX(+) together, and jumper TX(-) and RX(-) together. Then wire these to TR+ and TR- respectively on the BRI.



Wiring diagram of V-StationA RS-485 (2-wire) to the LNL-500B



Back of V-Station Unit

101.4.1 V-Pass FX and V-StationA Configuration

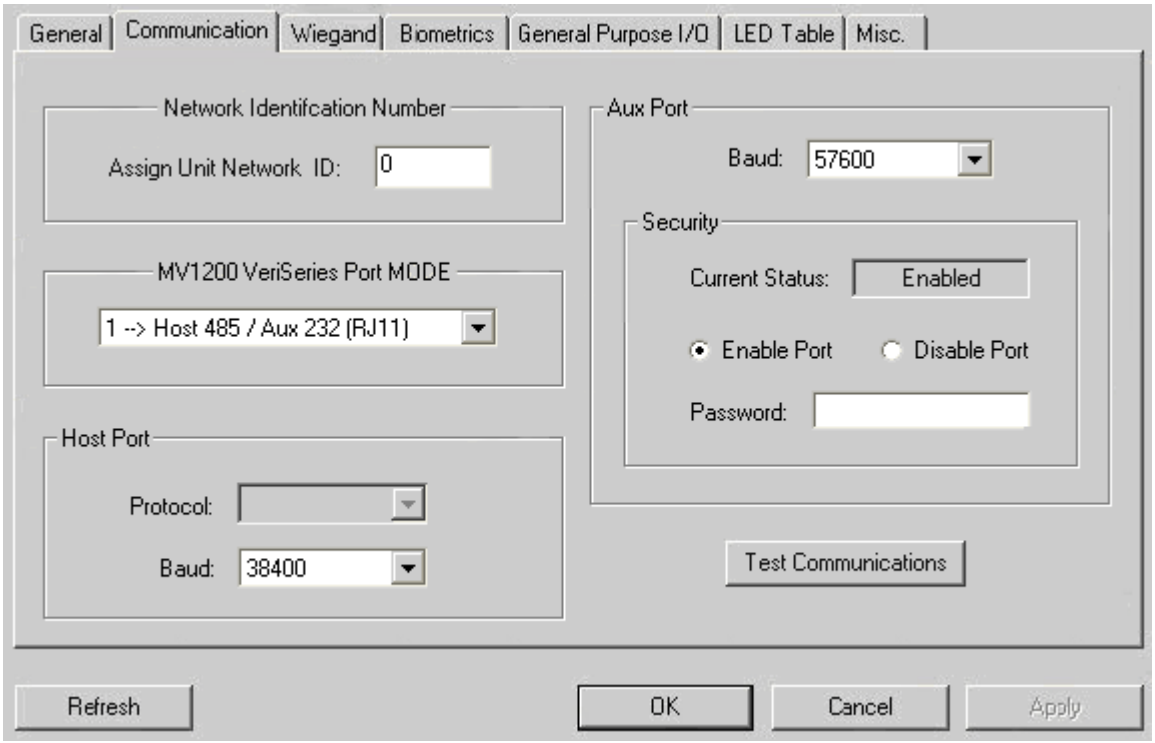
In order for the V-Pass FX (MV1610) readers to function properly, the firmware must be version 9.20. In order for the V-StationA readers to function properly, the firmware must be version 7.61 or later. The

firmware for these units must be upgraded using VeriAdmin. The reader must be configured using VeriAdmin software (version 7.40).

1. Configure the LED Table Settings for the reader in Idle, Enroll, or Verify modes as shown in section 101.5.2 LED Settings. To access the LED Table, select **LED Table Settings** from the **Configure** menu.
2. Enable the port using the Unit Parameter Settings window. The settings will be different for enrollment readers and verification readers.
3. The General tab displays the product, firmware, communication, and template information for the current reader.
4. On the Communication tab, select **Enable Port**. The settings for an enrollment reader are shown below.
   a. Network Identification Number: Assign the unit a network ID number. This can be any value from 0-7. This value corresponds to the address of the reader. IDs 0-3 will be connected to port 2 on the BRI and IDs 4-7 will be connected to port 3 on the BRI.

      For the reader interface (LNL-1300/1320/2220), the Network Identification Number must be 0.
   b. Host Port Protocol: This needs to be set to RS-485.
   c. Host Port Baud Rate: This should be set to 9600 baud. This needs to match the setting of the reader interface.

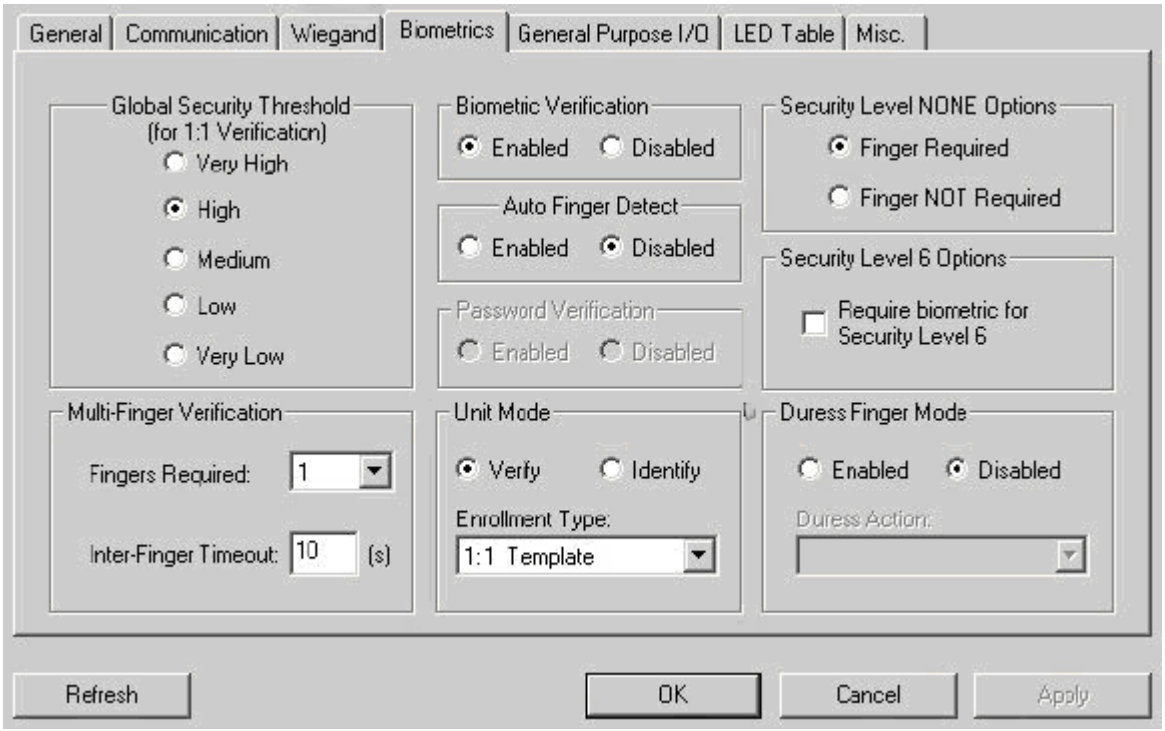
The settings for a V-Pass FX enrollment reader are shown below.



For a verification reader, the mode and baud rate must be changed. These settings must match the settings configured on the gateway and in the access control software.

5. On the Wiegand tab, set the Fail Site Code to **254** in order to report a Biometric Mismatch within Alarm Monitoring.

6. On the Biometrics tab,
   a. Select the Global Security Threshold.
   b. Make sure that the Biometric Verification is **Enabled**, and that **Finger Required** is selected.
   c. Select the number of fingers required and enter the Inter-Finger Timeout in seconds.



   d. Under Unit Mode:
      i. Select **Verify**.
      ii. For the Enrollment Type, select **1:1 Template**.
   e. If duress finger is used, the Duress Finger Mode must be **Enabled**. Otherwise, it is **Disabled**.
   f. On the Verification Response tab, make sure Verification Polling Mode is **Disabled**.
7. The default settings may be left on the General Purpose I/O tab (GPO 0=No Action).
8. On the Misc. tab:
   a. UNCHECK **Send Verification Result** for both the Host Port and Aux Port.

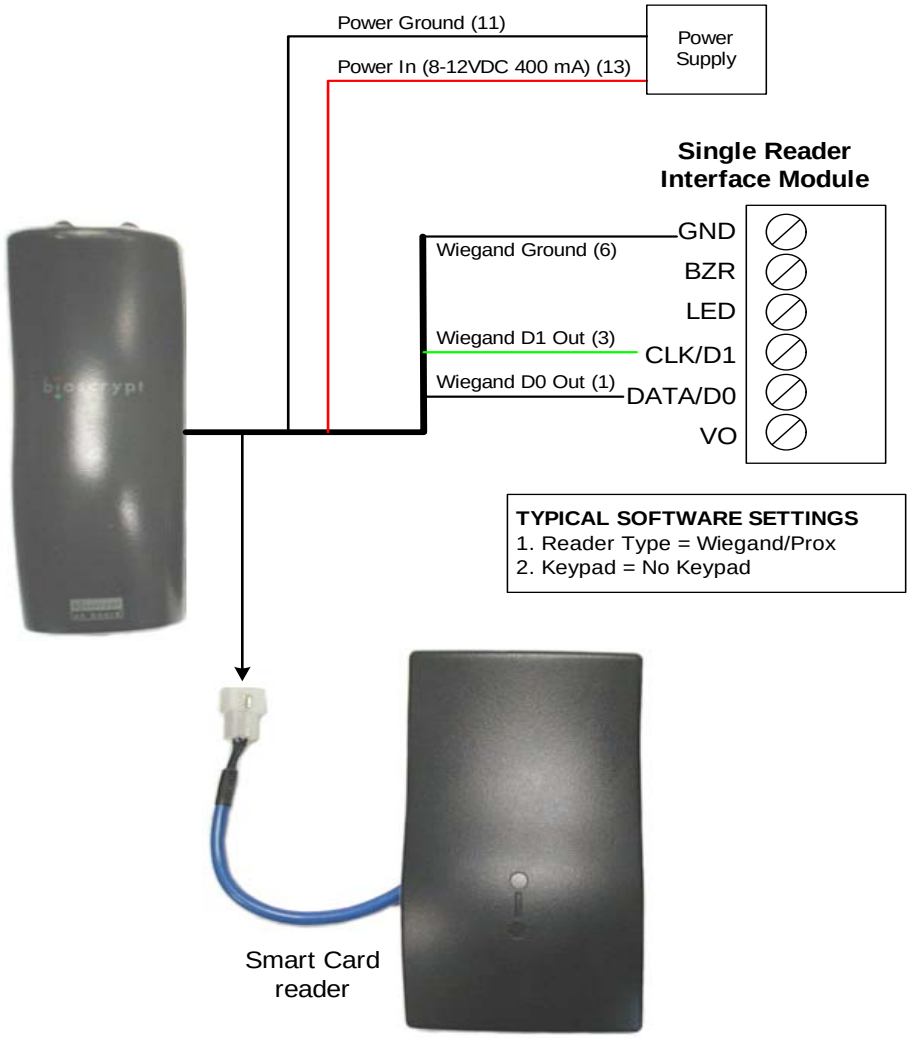
> **Important:** These checkboxes must be UNCHECKED. Leaving **Send Verification Result** checked (the Veri-Admin default) will result in a possibility of false access grants.

   b. Deselect **Line Trigger**.
   c. Select **Disabled** for the **Verification Polling Mode**.

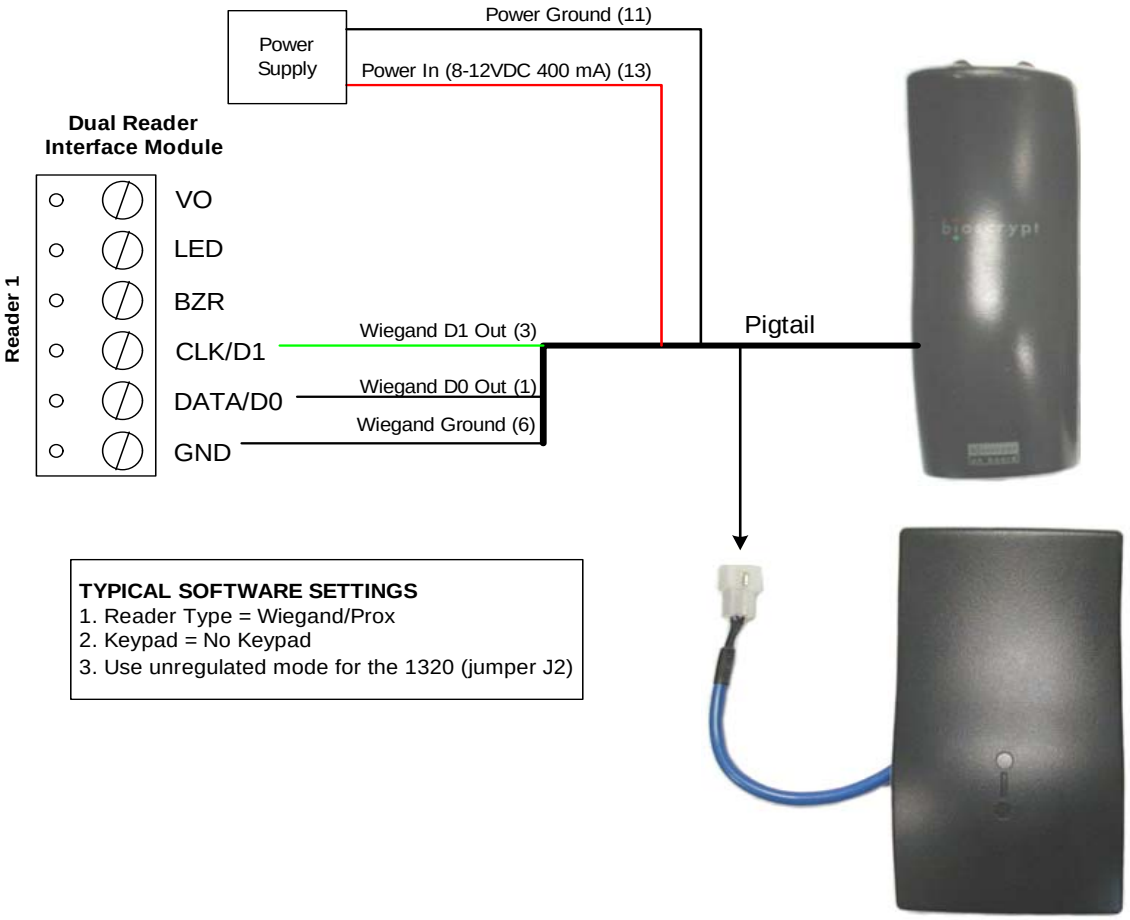
101.5 V-Smart

V-Smart readers can be used as access readers, connected to the Reader Interface Module (LNL-1300, LNL-1320) or intelligent dual reader controller (LNL-2220).

Wiring the V-Smart reader with the Single Reader Interface Module

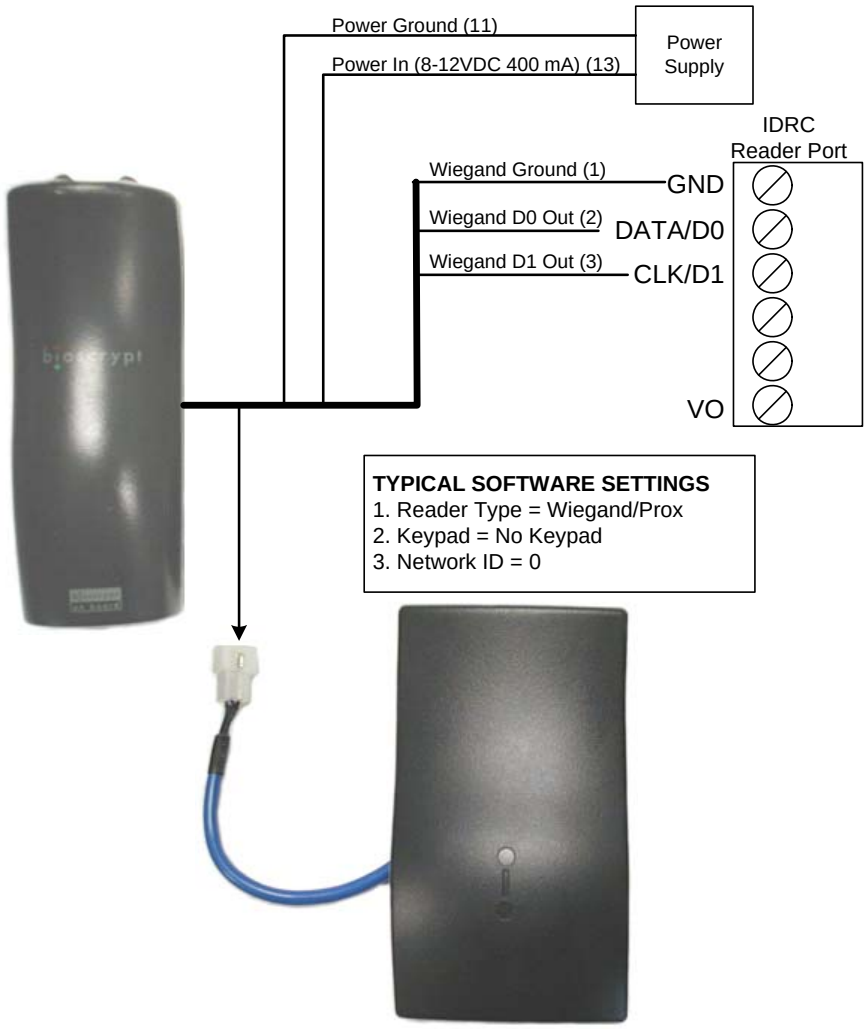


Wiring the V-Smart reader with the Dual Reader Interface Module



TYPICAL SOFTWARE SETTINGS
1. Reader Type = Wiegand/Prox
2. Keypad = No Keypad
3. Use unregulated mode for the 1320 (jumper J2)

Wiring the V-Smart reader with the Dual Reader Interface Module



101.5.1 Establish Communication

For the V-Smart readers to function properly, the firmware must be version 7.61 or later. The firmware for these units must be upgraded using VeriAdmin.

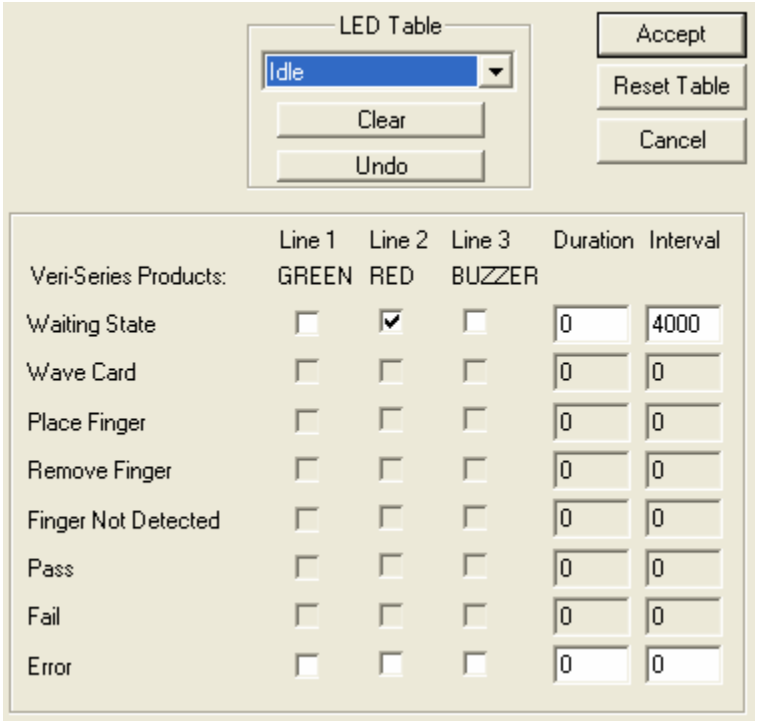
1. Establish communication with the reader. Connect the cables according to the Veri-Series Setup Guide.
2. Install the VeriAdmin software and start it.
3. If you are configuring a new unit, the Network Setup screen will automatically be displayed. Click [OK] to access the Network Configuration Manager. If this screen is not automatically displayed, from the **Configure** menu, select **Network Setup**.
4. Select the COM port to which the reader is connected.
5. Click [Add unit]. The new reader will appear online. Be sure to verify its status on the screen.

101.5.2 LED Settings

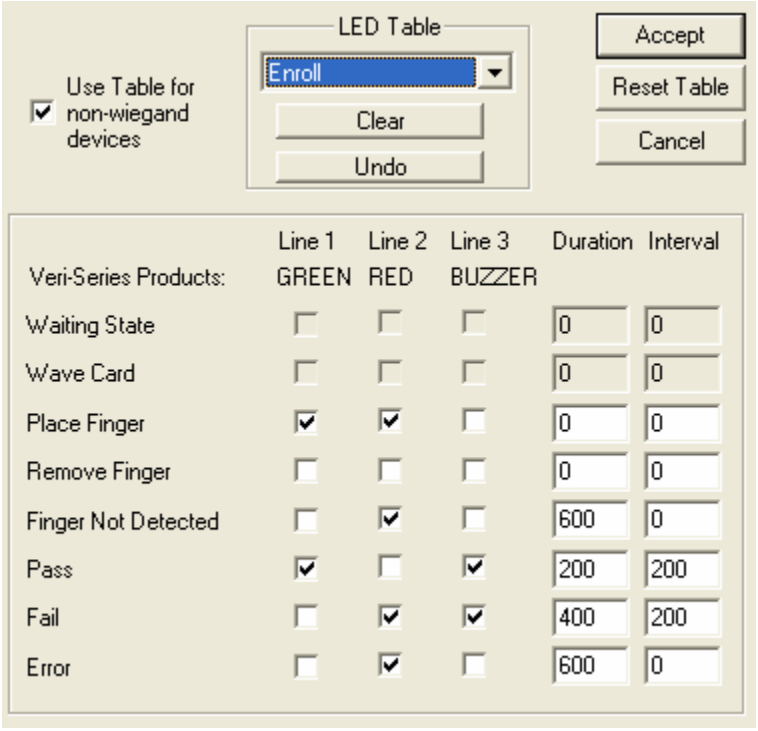
1. From the **Configure** menu, select **LED Table Settings**.

2. Configure the LED Table Settings for the reader in Idle, Enroll, or Verify modes. Configure the settings for the V-Smart reader as shown in the following screenshots.

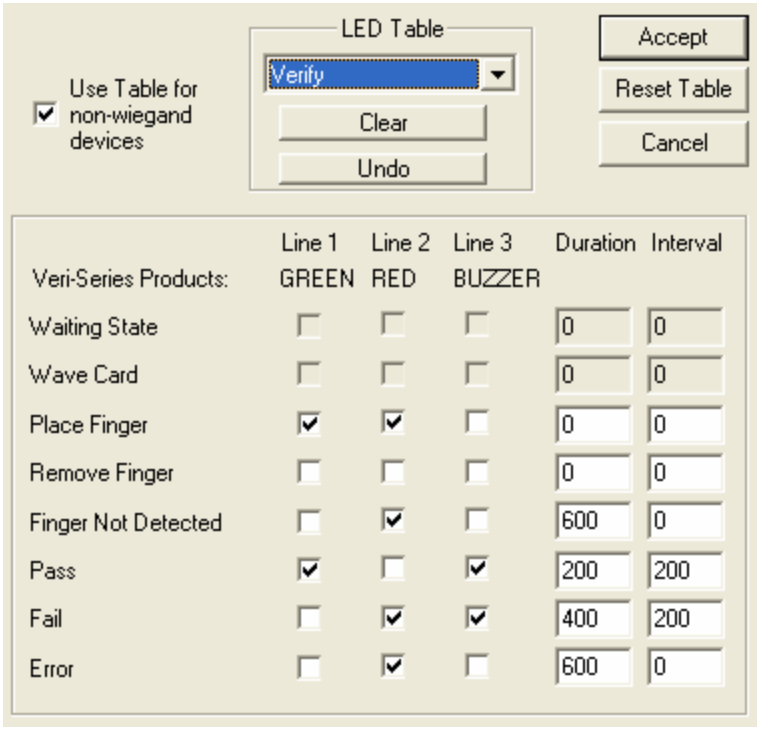
LED Table Settings for Idle mode



LED Table Settings for Enroll mode



LED Table Settings for Verify mode

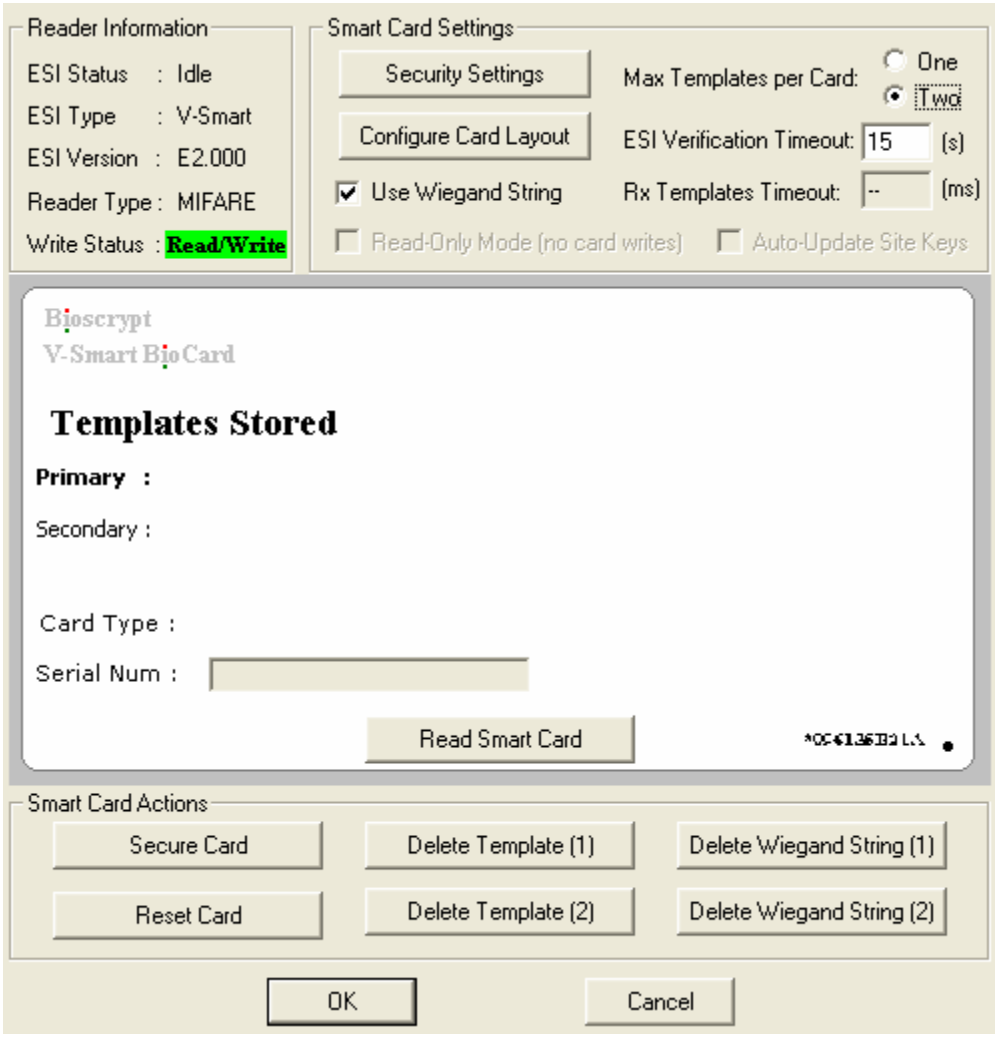


101.5.3 Smart Card Settings

If the Smart Card Manager shows an error, this means that the reader is not properly connected.

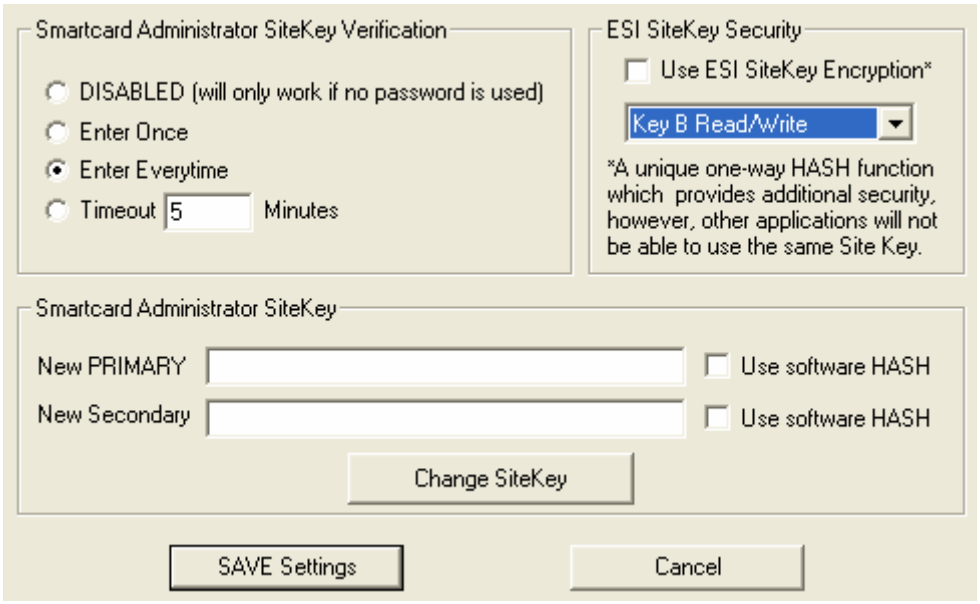
1. Configure the Smart Card settings via the Smart Card Manager. This is accessed by clicking the smart card button in the toolbar. For Reader Type, the smart card technology (MIFARE or iCLASS) should be stated here.

Smart Card Manager (MIFARE shown)



2. Click [Security Settings] to configure the smart card security settings.

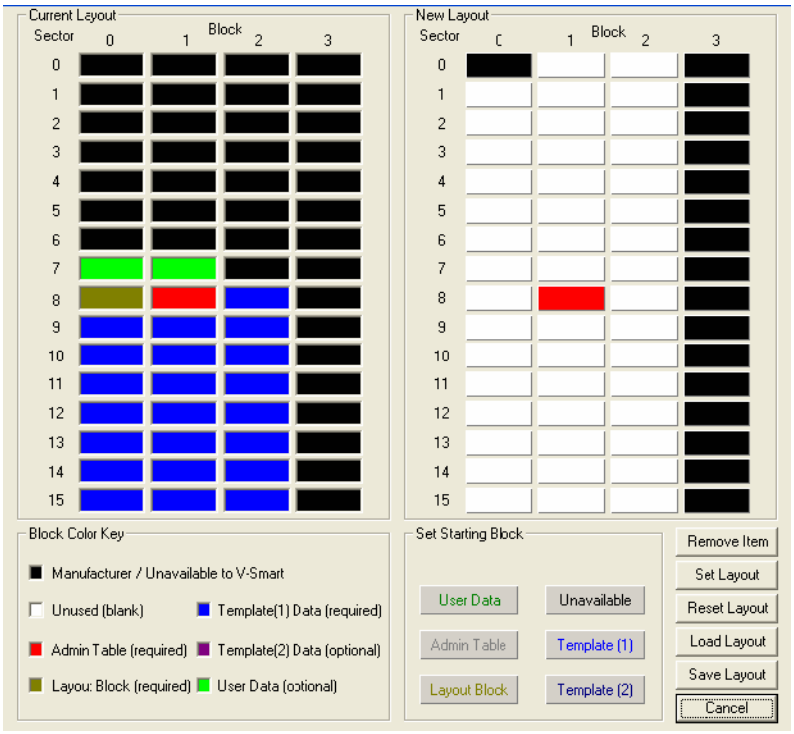
Smart Card Security Settings for MIFARE


Smartcard Administrator SiteKey Verification
DISABLED (will only work if no password is used)
Enter Once
Enter Everytime
Timeout 5 Minutes
ESI SiteKey Security
Use ESI SiteKey Encryption*
Key B Read/Write
*A unique one-way HASH function which provides additional security, however, other applications will not be able to use the same Site Key.
Smartcard Administrator SiteKey
New PRIMARY
Use software HASH
New Secondary
Use software HASH
Change SiteKey
SAVE Settings
Cancel

   a. In the ESI SiteKey Security section, if you are using a MIFARE reader, **Key B Read/Write** should be selected. If you are using an iCLASS reader, this field will be blank.
   b. Note that all units should be configured to these specifications for the Smartcard Administrator SiteKey:
      – Primary SiteKey: **C5RH9kVI7yDzSQu**
      – Secondary SiteKey: blank
      – "Use software HASH" should NOT be selected
   c. After typing in the site key, click [Change SiteKey].
   d. A confirmation message will be displayed. Click [Accept].
   e. You will be asked to enter the current sitekey. If you have a brand new reader, there is no sitekey assigned yet and you may leave this field blank. Otherwise, enter the current sitekey.
   f. Click [SAVE Settings].

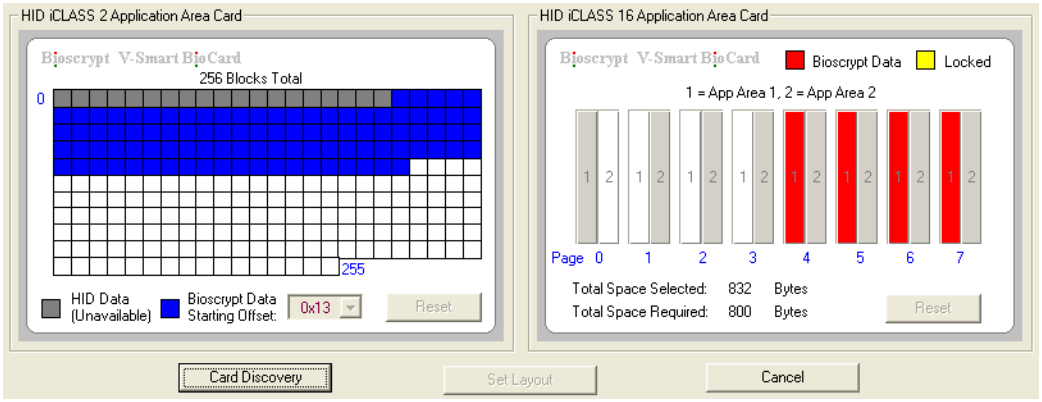
3. Click [Configure Card Layout] to access the Smart Card Layout Manager. If you have a MIFARE V-SmartA-G reader, configure the smart card layout to match the layout shown under "Current Layout."
Sector 7, blocks 0 and 1 should be configured as user data.
Sector 8, block 0 should be a layout block.
Sector 8, block 2 should be template (1). For sectors 9 through 15, blocks 0, 1, and 2 should also be template (1).

MIFARE Smart Card Layout Manager



For iCLASS readers, cards should already be encoded. If you require encoding, use an iCLASS encoder for the enrollment workstation. Using Bioscrypt tools will create a 1K card, which is not practical.

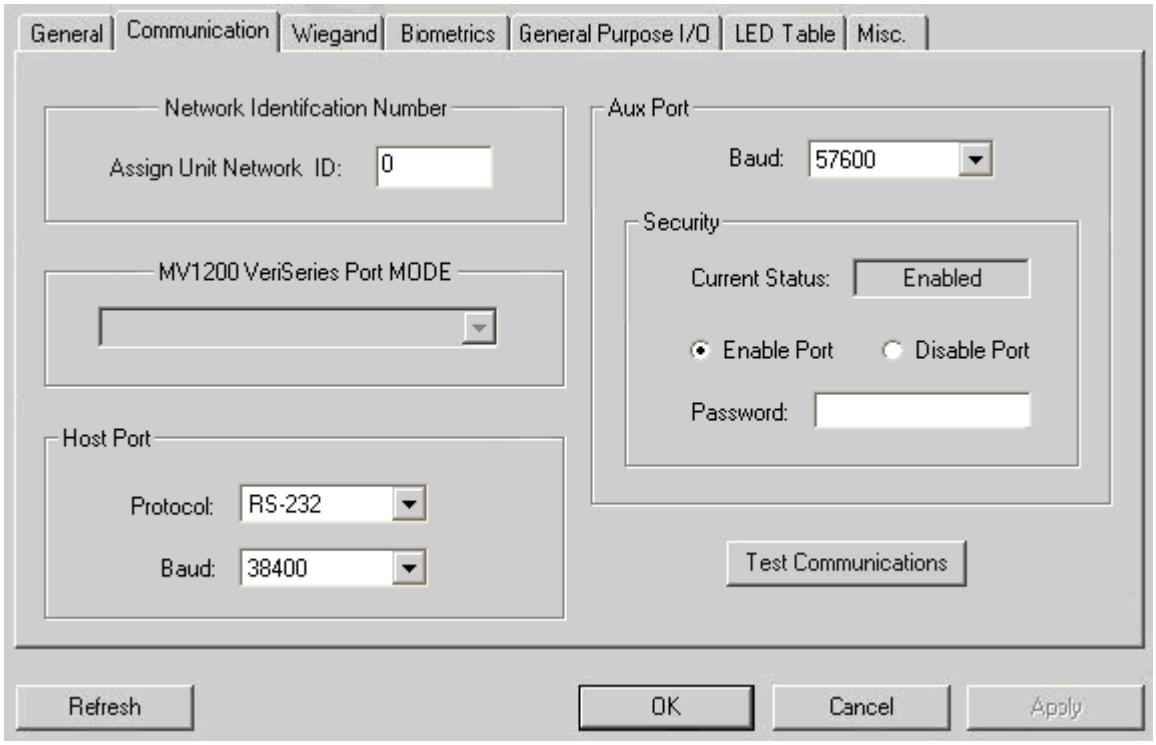
iCLASS Smart Card Layout Manager



101.5.4 Unit Parameter Settings

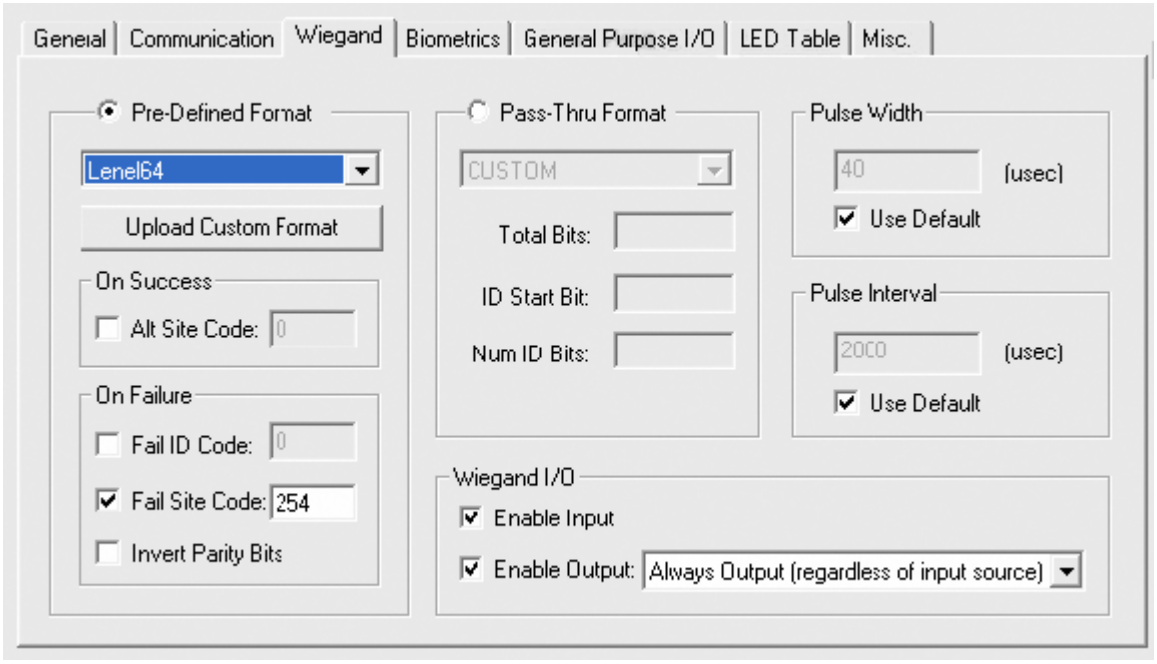
1. From the **Configure** menu, select **Unit Parameters**.
2. The Unit Parameter Settings window appears.
   a. The General tab displays the product, firmware, communication, and template information for the current reader.

b. On the Communication tab, assign the network ID, select port mode and baud rate. Select **Enable Port**. The settings for an enrollment reader are shown below.



- For the MV1200 VeriSeries Port MODE, mode 0 should be selected. You will lose communication to the reader if you select mode 2!
- The default baud rate for the host port (on an enrollment/capture station) is 57600.
- Initially, the Aux Port is disabled and protected by a password. In order to use any of the V-Smart units for enrollment in OnGuard, the Aux Port must be enabled with this password: **95186274**. The software will then recognize this password, and enable the Aux Port without user intervention.

c. On the Wiegand tab, set the **Pass-Thru Format**. Enable Input and Selective Output under Wiegand I/O.



With OnGuard 2010, Alarm Monitoring has the capability of displaying biometric mismatch events. If you are planning to enable the Biometric Mismatch capability:

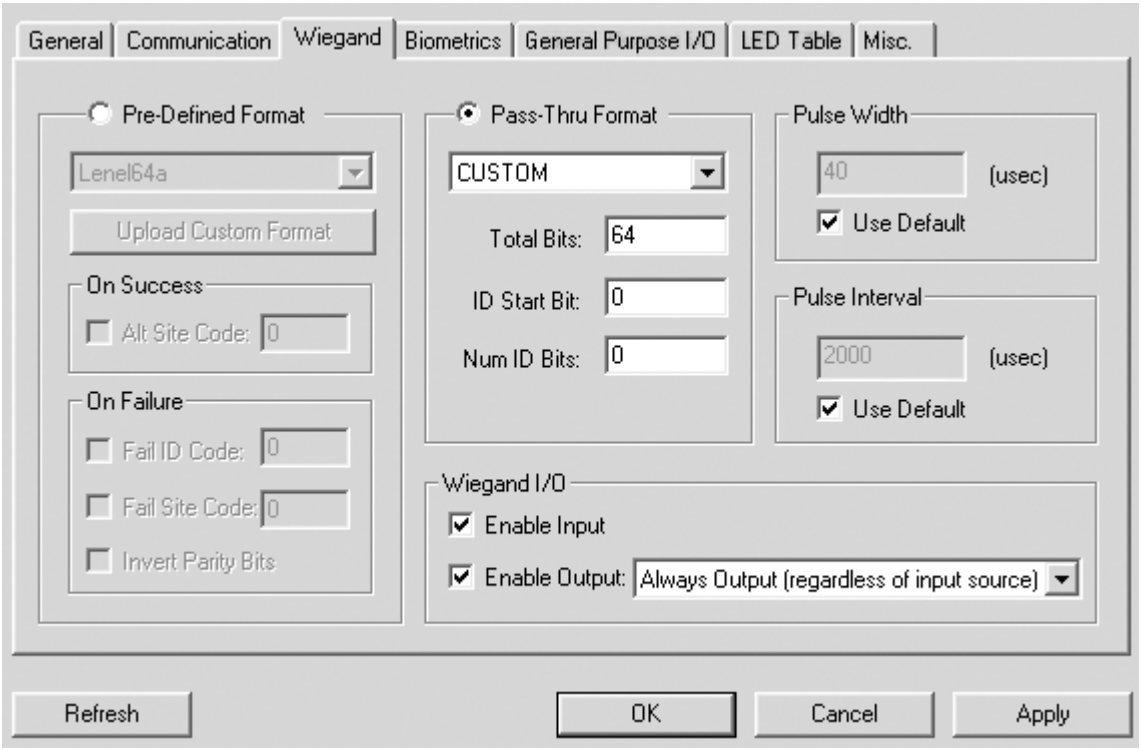
– Select the **Pre-Defined Format** radio button.

– In the format drop-down list, select **Lenel64**. This custom format can be found on the Supplemental disc. Click [Upload Custom Format] and navigate to the Lenel64.wgf file (found on the Supplemental disc) to select it.

  The card format corresponding to the Lenel64 custom format must be 64 bits long. The issue code start bit should be 56, and the number of bits should be 8. Bits 0 through 55 can be configured in any way you choose. The recommended format is Lenel 64-bit Wiegand (0/8, 8/48, 56/8).

– In the **On Failure** section, check the box for **Fail Site Code**. Enter the code (254) next to it.

If you are using Pass-Thru Format, the Wiegand tab must be configured as follows:



Note: The ID bits defined in VeriAdmin correspond to the template ID (which is not utilized by the access control software), and not the OnGuard badge ID.

d. On the Biometrics tab,

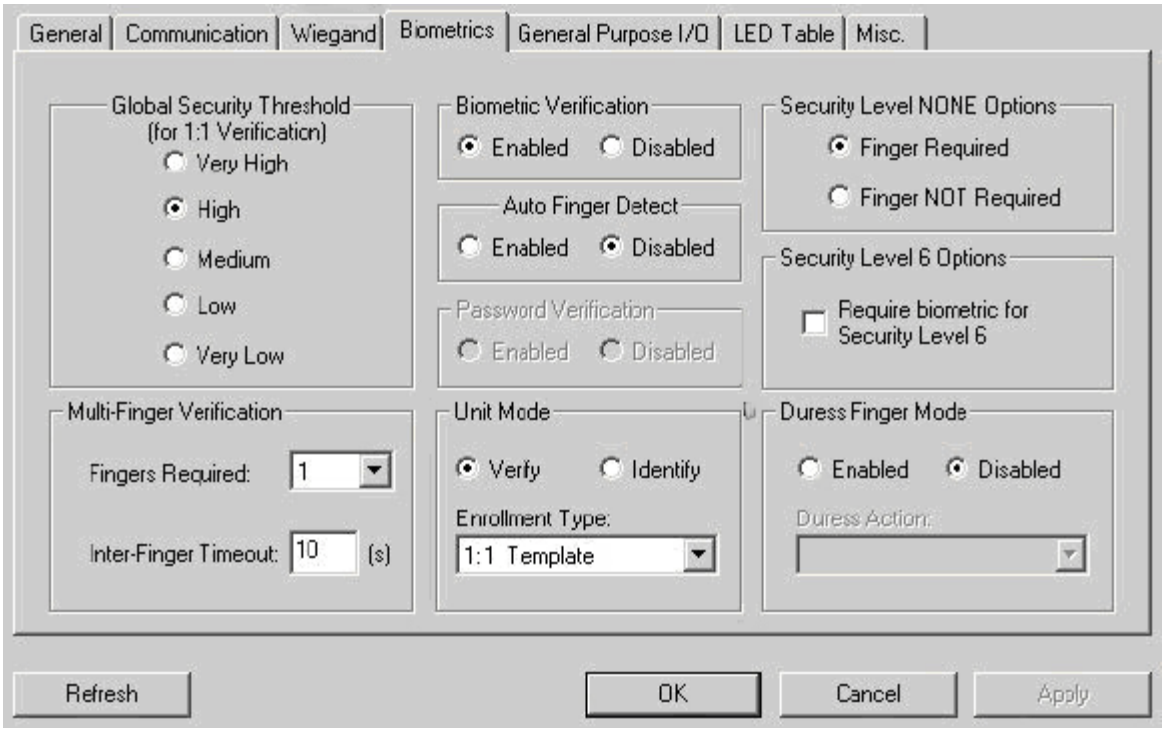
- Change the Global Security Threshold to **Very High**.

Note: If a level of security is defined in OnGuard other than "Very High," it will override this reader configuration.

- Make sure that the Biometric Verification is **Enabled**, and that **Finger Required** (under Template Security) is selected.
- Select the number of fingers required and enter the Inter-Finger Timeout in seconds.
- If you wish, you may enable Password Verification (this will only apply to V-Station-G and V-Station-H units).

Note: Remember that if a cardholder PIN is modified in OnGuard, it must also be re-encoded on the smart card!

- If duress finger is used, the Duress Finger Mode must be **Enabled**. Otherwise, it is **Disabled**.



e. On the Verification Response tab, make sure Verification Polling Mode is **Disabled**.

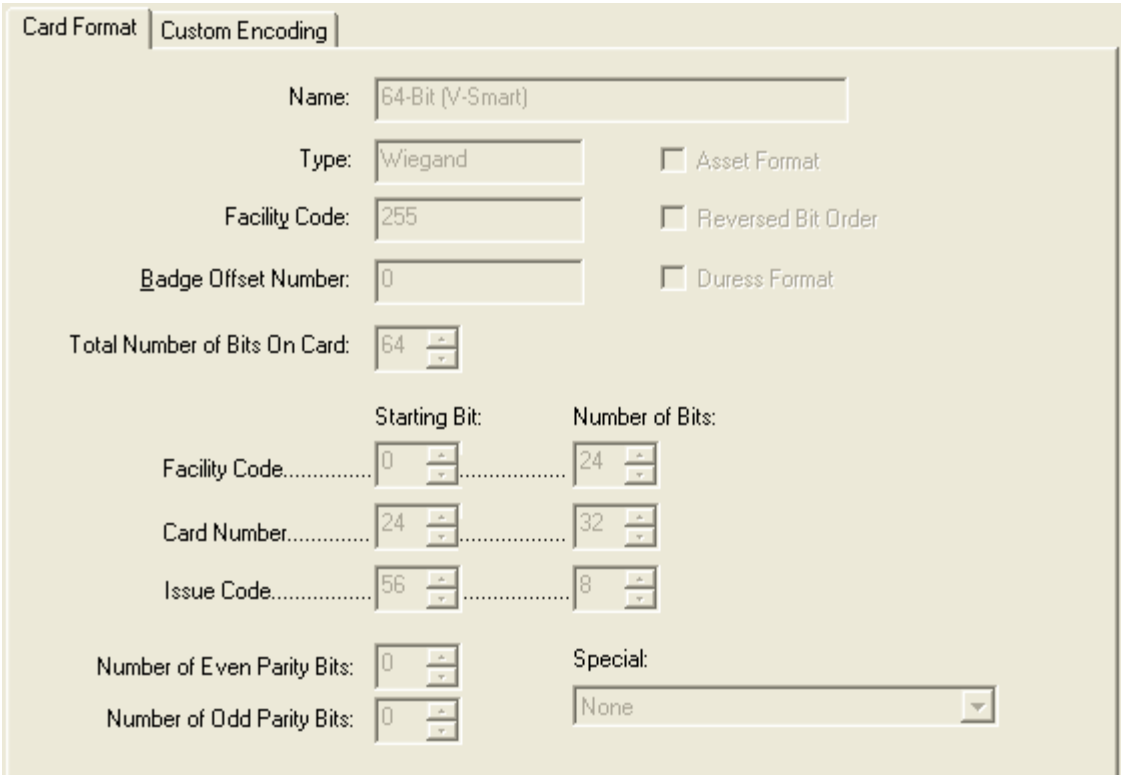
f. The default settings may be left on the General Purpose I/O tab (GPO 0=No Action).

101.5.5 Card Format Configuration

Once the reader has been configured using the VeriAdmin software, exit the program. You will then need to set up card format and encoding for the V-Smart using the access control software. For more information, please refer to the System Administration User Guide.

A Wiegand card format must be created prior to configuring a smart card format with a Bioscrypt access control card format. This configuration must match the Wiegand format that the V-Smart reader will output. The following is the suggested Wiegand 64-bit card format configuration to use with a Bioscrypt access control application.

Note: Access control card formats for Bioscrypt smart cards must have the maximum of 64 total number of bits on card.



After the Wiegand card format is created, define a smart card format to be used during card encoding.

101.5.6 V-Smart Reader Operation

Before using the V-Smart reader, a Wiegand card format must be created for Bioscrypt smart cards, having a maximum of 64 total number of bits on card.

1. Present the smart card to the reader.
2. When the light turns yellow, place your finger on the sensor. For enrollment and verification processes, remember to use the RidgeLock for finger placement consistency.

3. When the light turns off, remove your finger.

Indicator Light

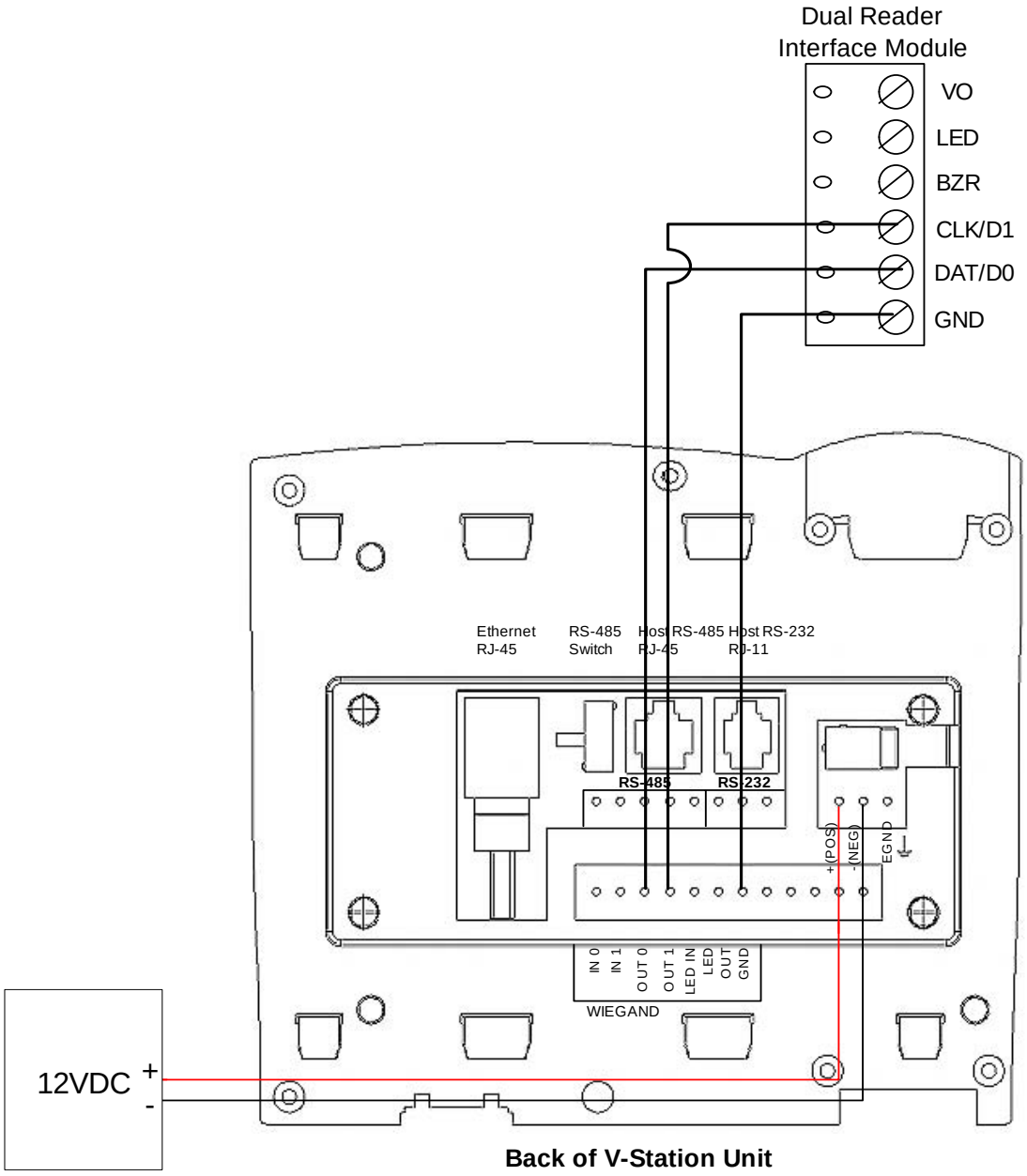
Light	Means...
Yellow	Place finger
Off	Remove finger
Green	Success
Red	Failure

Note: For more information, refer to the Bioscrypt V-Smart manual(s).

101.6 V-StationA-G and V-StationA-H

The V-StationA-G (MIFARE model) and V-StationA-H (iCLASS model) readers handle card and fingerprint verification. Communication between the V-StationA (G or H) reader and the LNL-1300/1320/2220 is done via Wiegand connection.

Wiring diagram of V-StationA (G/H) to the reader interface module



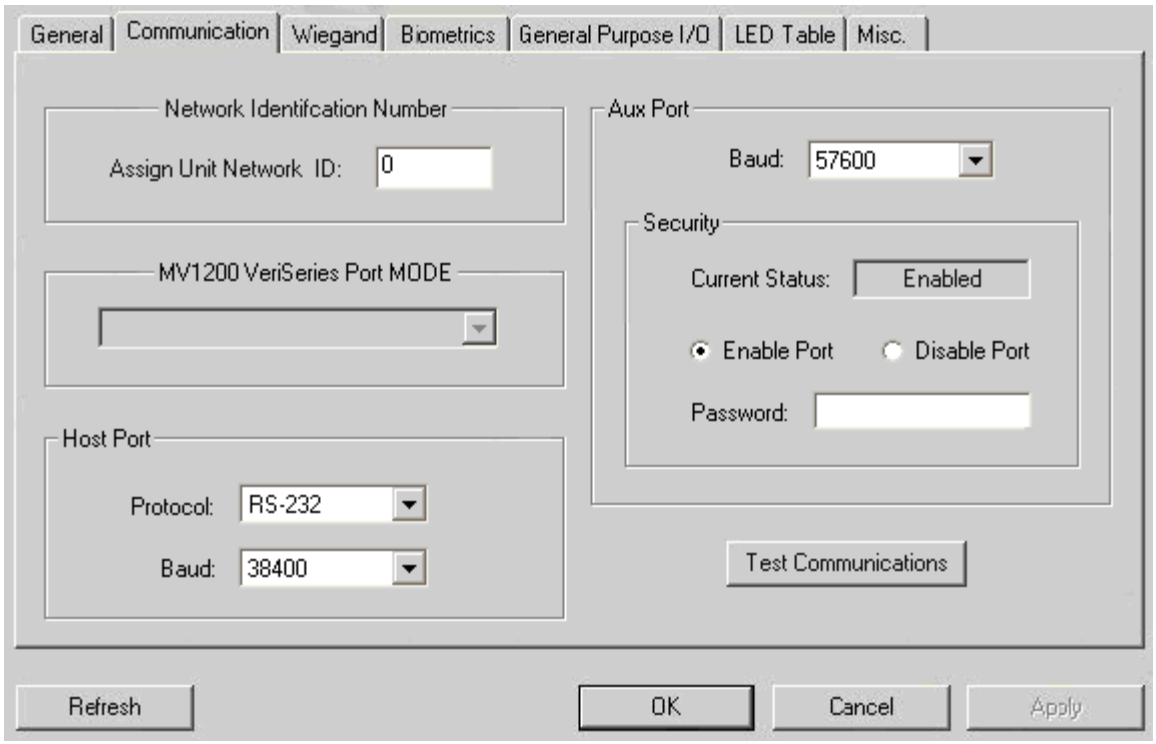
101.6.1 V-StationA-G and V-StationA-H Configuration

In order for the V-Station readers to function properly, the firmware must be version 7.61 or later. The firmware for these units must be upgraded using VeriAdmin.

The reader must be configured using VeriAdmin software.

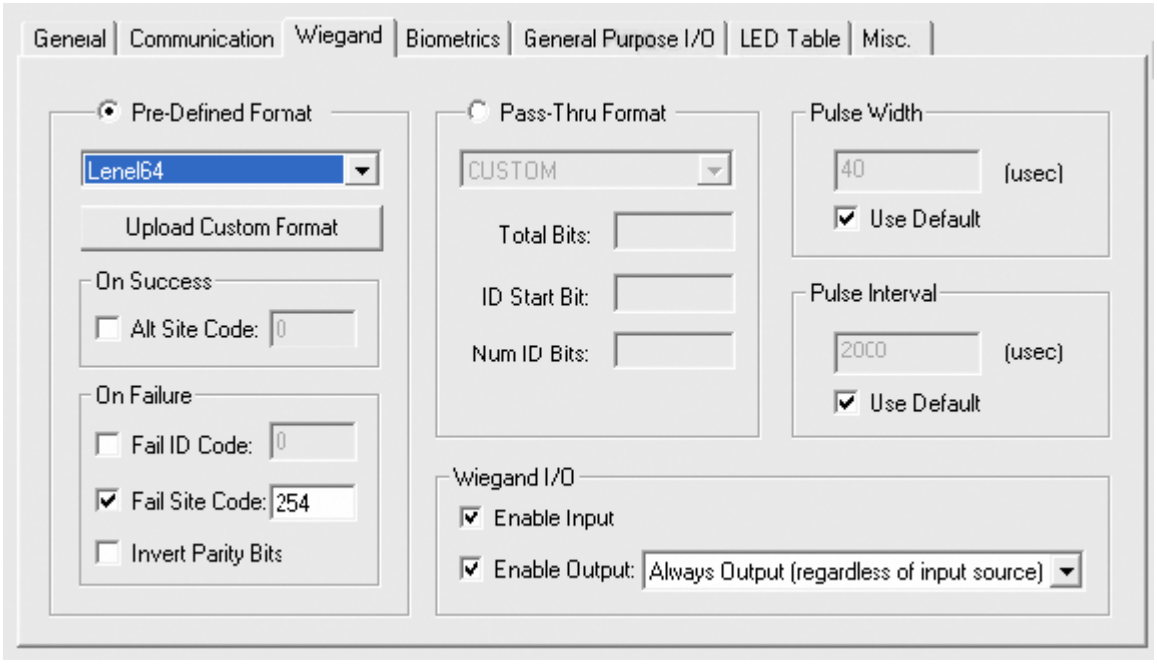
1. Configure the LED Table Settings for the reader in Idle, Enroll, or Verify modes as in the previous section. To access the LED Table, select **LED Table Settings** from the **Configure** menu.

2. Enable the port using the Unit Parameter Settings window. The settings will be different for enrollment readers and verification readers.
   a. The General tab displays the product, firmware, communication, and template information for the current reader.
   b. On the Communication tab, select **Enable Port**. The settings for an enrollment reader are shown below.
      – Network Identification Number: Assign the unit a network ID number. This can be any value from 0-7. This value corresponds to the address of the reader.
      – Host Port Protocol: This needs to be set to RS-485.
      – Host Port Baud Rate: This can be set to either 38400 or 9600 baud.



For a verification reader, the mode and baud rate must be changed. These settings must match the settings configured on the gateway and in the access control software.

c. On the Wiegand tab, set the **Pass-Thru Format**. Enable Input and Selective Output under Wiegand I/O.



With OnGuard, Alarm Monitoring has the capability of displaying biometric mismatch events. If you are planning to enable the Biometric Mismatch capability:

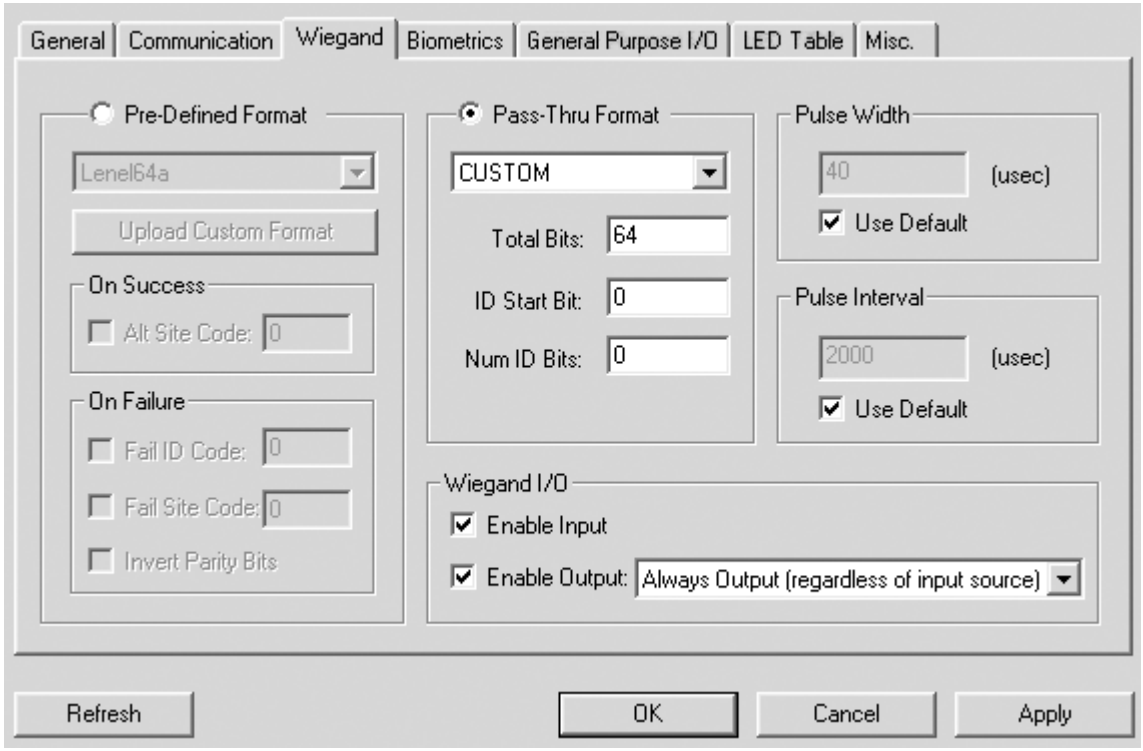
– Select the **Pre-Defined Format** radio button.

– In the format drop-down list, select **Lenel64**. This custom format can be found on the OnGuard Supplemental disc. Click [Upload Custom Format] and navigate to the Lenel64.wgf file to select it.

  The card format corresponding to the Lenel64 custom format must be 64 bits long. The issue code start bit should be 56, and the number of bits should be 8. Bits 0 through 55 can be configured in any way you choose. The recommended format is Lenel 64-bit Wiegand (0/8, 8/48, 56/8).

– In the **On Failure** section, check the box for **Fail Site Code**. Enter the code (254) next to it.

If you are using Pass-Thru Format, the Wiegand tab must be configured as follows:



d. On the Biometrics tab,

– Change the Global Security Threshold to **Very High**.

Note: If a level of security is defined in OnGuard other than "Very High," it will override this reader configuration.

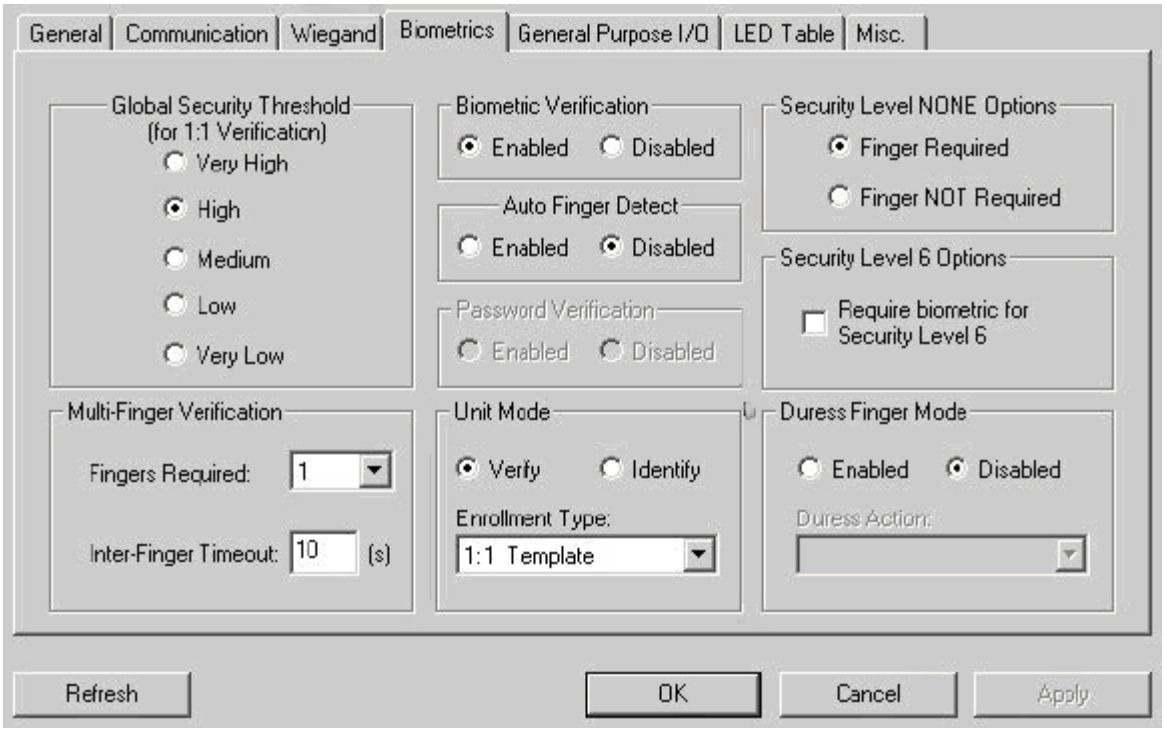
– Make sure that the Biometric Verification is **Enabled**, and that **Finger Required** (under Template Security) is selected.

– Select the number of fingers required and enter the Inter-Finger Timeout in seconds.

– If you wish, you may enable Password Verification (this will only apply to V-Station-G and V-Station-H units).

Note: Remember that if a cardholder PIN is modified in OnGuard, it must also be re-encoded on the smart card!

– If duress finger is used, the Duress Finger Mode must be **Enabled**. Otherwise, it is **Disabled**.



e. On the Verification Response tab, make sure Verification Polling Mode is **Disabled**.

f. The default settings may be left on the General Purpose I/O tab (GPO 0=No Action).

101.6.2 Encoding Smart Cards

The V-Smart and V-Station readers can be used to encode cardholder data to a smart card. In order to encode smart cards, System Administration must be used for proper configuration.

1. Create the appropriate smart card format.
2. In the **Badge Types** folder, under the **Encoding** form, add the card format to be encoded.
3. In the **Workstations** folder, under the **Encoders/Scanners** form, add the reader being used to encode the smart card.

Note: For more information, refer to the System Administration User Guide.

101.6.3 Additional V-Station Options

The V-Station keypad has the capability of accepting PIN entries. The [Enter] button corresponds to [#]. This functionality applies to card and PIN mode, biometric verify, and cipher mode.

Commands may be executed using [Clear] in place of the [*] key.

For units that have a smart card reader, a cardholder PIN can be encoded on the smart card. When entering your PIN, press the sequence of numbers followed by the [Enter] button.

1. User VeriAdmin to configure the following settings.
   a. In Unit Parameters, under the Wiegand tab
      – Total Bits: 32
      – ID Start: 0
      – Number ID: 32
   b. In the Unit Parameters, under the Biometrics tab
      – Password Verification: Enabled
   c. For MV1200 and MV1610 devices that are connected to biometric gateway or reader interface modules and configured as Bioscrypt RS-485 readers in OnGuard, enable PIN capability by doing the following:

      In the Unit Parameters, under the Misc. tab
      – Verification Polling Mode: Enabled
      – Polling Mode: Keypad Only
   d. In the Smart Card Manager, check the **Use Wiegand String combo-box**.
2. Open the Card Formats form in System Administration.
3. Configure V-Smart (iCLASS/MIFARE) card formats with the corresponding Wiegand Access Control card format (maximum of 32 total number of bits on card).

Note: Currently, Wiegand formats longer than 32 bits are incompatible with the V-Station's Password option.

This will result in the cardholder’s PIN being encoded and stored in the template’s password field.

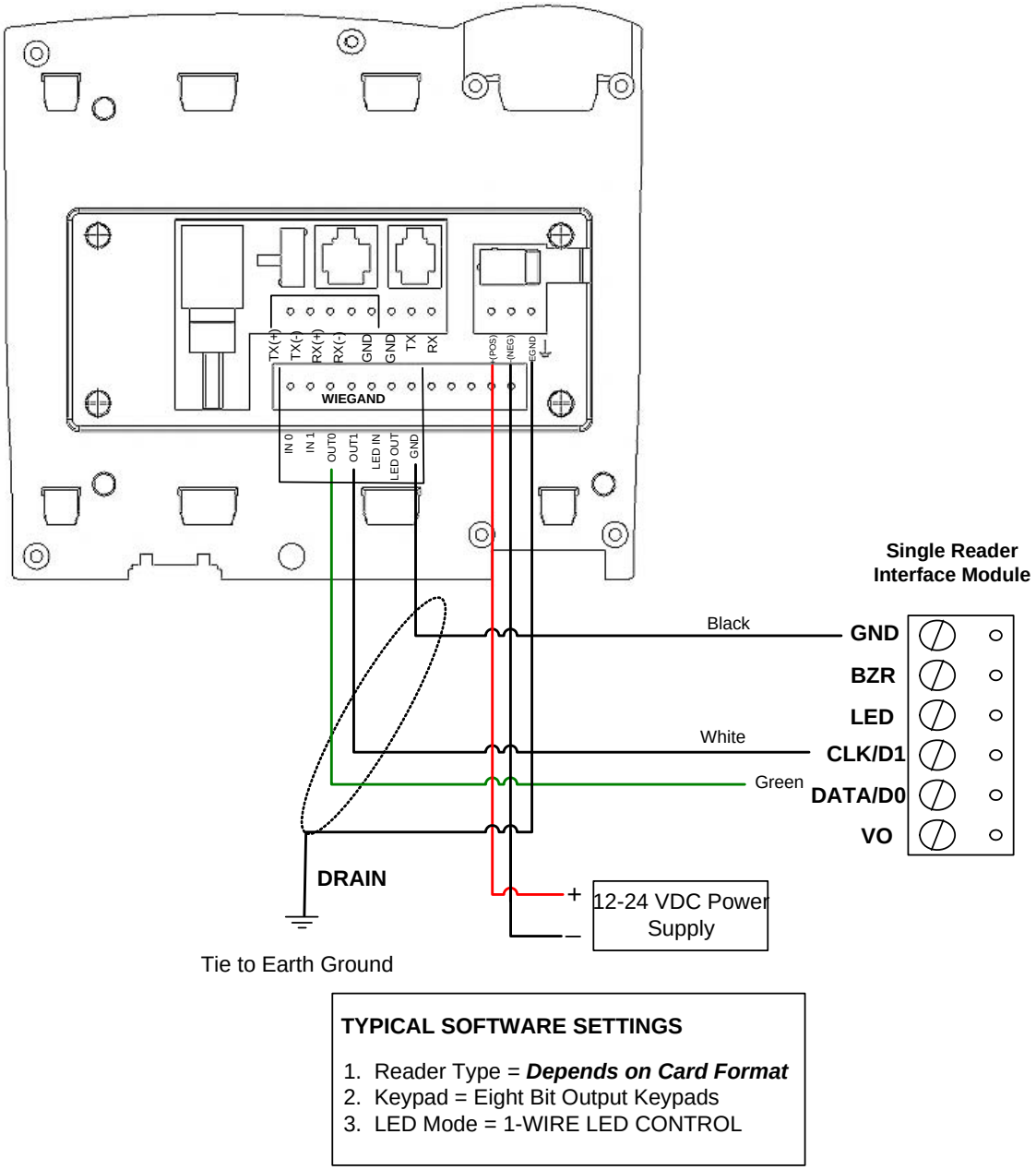
101.7 PIV-Station

The average reader current draw is 0.50 amps at 12 VDC with a maximum draw of 1.00 amp at 12 VDC. General power requirements: +12.5 to 24 VDC. This reader cannot be powered from a reader interface module reader port.

101.7.1 PIV-Station Wiring

Wire the reader as follows.

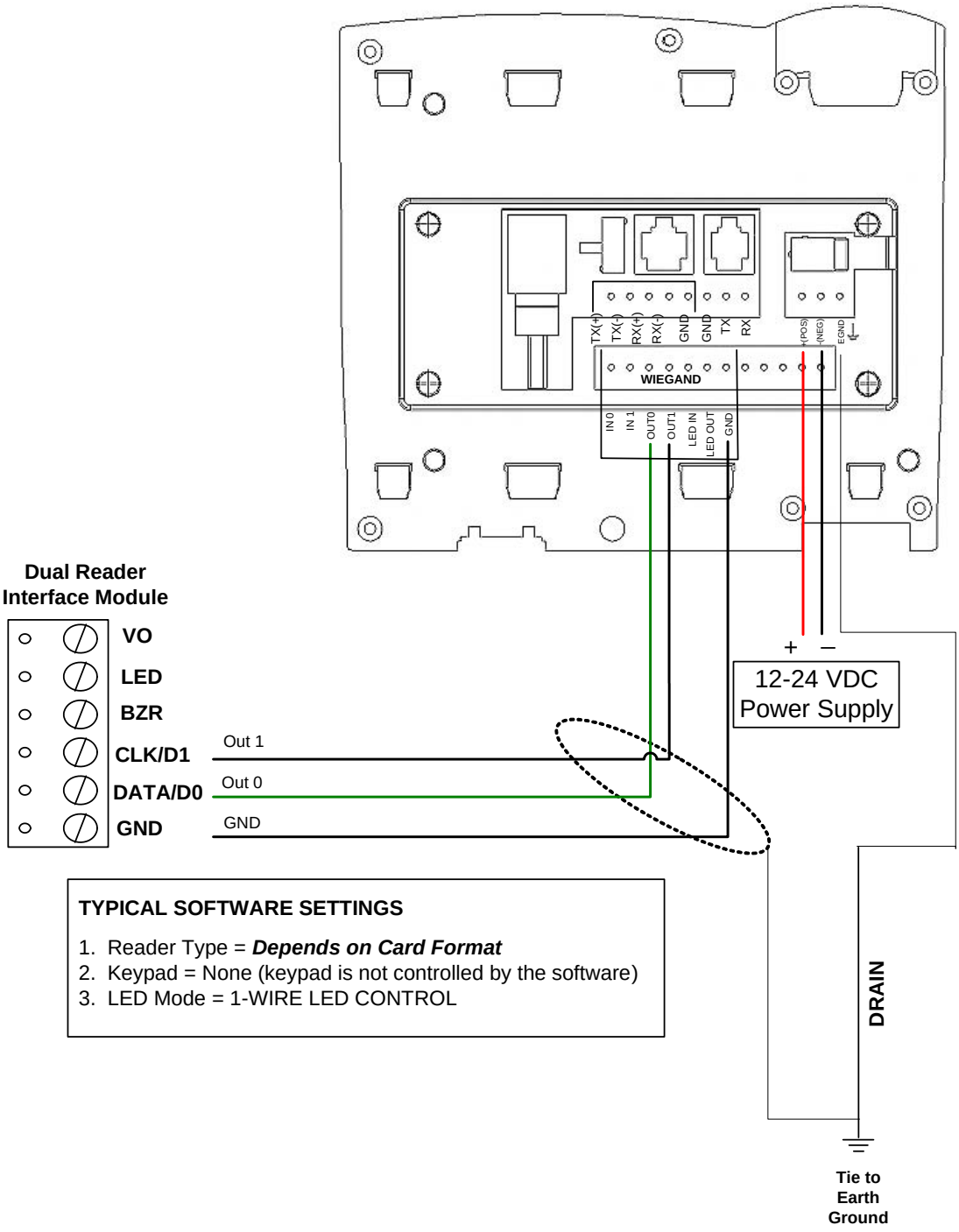
Wiring diagram of the reader and single reader interface module



TYPICAL SOFTWARE SETTINGS

1. Reader Type = ***Depends on Card Format***
2. Keypad = Eight Bit Output Keypads
3. LED Mode = 1-WIRE LED CONTROL

Wiring diagram of the reader and dual reader interface module



TYPICAL SOFTWARE SETTINGS

1. Reader Type = ***Depends on Card Format***
2. Keypad = None (keypad is not controlled by the software)
3. LED Mode = 1-WIRE LED CONTROL

101.7.2 PIV-Station Configuration

Use VeriAdmin to configure the reader. In the Unit Parameters, under the Wiegand tab, there are two possible configurations:

- **FASC-N 75 MSB Low Assurance Wiegand Output** If you are using FASC-N 75 MSB Low Assurance Wiegand Output, in the access control software, for the Reader Type, select Wiegand/Prox.

- **FASC-N 200 MSB Low Assurance Wiegand Output** If you are using FASC-N 200 MSB Low Assurance Wiegand Output, in the access control software, for the Reader Type, select Mag w/ Wiegand Output.

101.8 V-Station and V-Flex 4G Readers

The V-Station 4G and V-Flex 4G readers can be used with OnGuard as V-Station and V-Flex MV-1200/MV1610 devices for capturing and for fingerprint verification with primary and secondary templates. The readers can be used for encoding V-Smart iCLASS or V-Smart MIFARE smart card formats. For verification and reading fingerprint templates, communication between the reader and the LNL-1300/1320/2220/500B is done via RS-485 connection. For reading access control and the primary and secondary fingerprint template data, communication between the reader and the LNL-1300/1320/2220/500B is done via Wiegand output.

101.8.1 4G Registration

4G readers must be configured using SecureAdmin. Obtain this software from the manufacturer disc or web site.

1. Connect the reader to the computer using a USB cable. Verify that “V-Series 4G (COM n)” is listed in the Device Manager under Ports (this is the emulator), where n is the COM port number assigned for this reader.
2. Start the SecureAdmin software and log in.
3. On the Network tab, click Register via Client. Configure the following settings:
   a. Port: Select the port number to which the device is connected.
   b. Baud Rate:
      – If you are using the reader for enrollment/capturing, select 115,200.
      – If you are using the reader for verification, select 38,400.
   c. Device ID:
      – If you are using the reader as an enrollment/capture device, the ID should be 0.
      – If you are using the reader for verification, select any other ID.

   Click [Next].
4. Verify the device information and server communication parameter. Click [Next].
5. Type in a device name. Do not change the group. Click [Register].
6. Information will be displayed in the device summary. Click [OK].

101.8.2 4G Configuration

After the reader has been registered, you will need to configure the following parameters.

1. In SecureAdmin, on the Device Settings tab, navigate to your reader under Device Network > Default Group. Double-click on the reader.
2. On the Communication tab, verify the following settings:
   a. Device ID

- If you are using the reader as an enrollment/capture device, the ID should be 0.
- If you are using the reader for verification, select any other ID.

b. Protocol: RS-485

c. Baud Rate:

- If you are using the reader for enrollment/capturing, select 115,200.
- If you are using the reader for verification, select 38,400.

Click [Apply].

3. On the Wiegand tab, configure the following:
   a. Under Wiegand Format
      i. Select **Passthru**.
      ii. Total Bits: this is a configurable setting with a maximum of 64 (default value).
      iii. ID Start Bit: this is a configurable setting with 0 as a default value.
      iv. Total ID Bits: this is a configurable setting with a maximum of 64 (default value).
   b. Under Miscellaneous Settings
      i. Set Pulse Width To: 40
      ii. Set Pulse Interval To: 2000
   c. Select **Activate Wiegand Input**.
   d. If you are using the reader for reading access control and primary and secondary fingerprint template data when the device is communicating via Wiegand output, select **Activate Wiegand Output** and **Always output (regardless of input source)**.

   Click [Apply].
4. On the Biometrics tab, configure the following:
   a. Under Global Security Threshold
      i. Verify: High
      ii. Identify: Low.
   b. Under Device Mode
      i. Select **Verify**.
      ii. Template Type: 1:1 TEM
   c. Under the Multi-User Verification
      i. Number of Users: 1
      ii. Inter-Finger Timeout: 10
   d. Select **Activate Biometric Verification**.

   Click [Apply].
5. On the Miscellaneous tab, configure the following:
   a. Under Send Verification Result
      i. For Host Port, select **Always (With ID)**.
      ii. For Auxiliary Port, select **Always (With ID)**.
   b. Select **Activate Verification Polling Mode**.
   c. Select the appropriate setting for Initiate Verification By.

   Click [Apply].

101.8.3 Enrollment Configuration

1. With the reader connected to the computer using a USB cable, verify that “V-Series 4G (COM n)” is listed in the Device Manager under Ports (this is the emulator).
2. In System Administration, in the Cardholders folder, click [Capture] to start Multimedia Capture.
3. Select the correct **COM port** and **Baud rate** for the Sensor settings.
4. On the Fingerprint (Bioscrypt) tab, under Primary template, select the desired settings for **Biometric feature**, **Security level**, and **Store image**.
5. Capture biometrics. During enrollment for the primary template, the fingerprint template image is displayed for the selected valid active cardholder badge.
6. On the Fingerprint (Bioscrypt) tab, under Secondary template, select the desired settings for **Biometric feature**, **Security level**, and **Store image**.
   Additionally, select the **Make duress finger** check box. If this option is enabled, you must also select **Activate Duress Finger Mode** and **Reverse Wiegand Output** in SecureAdmin.
7. Capture biometrics. During enrollment for the secondary template, the fingerprint template image is displayed for the selected valid active cardholder badge.

101.8.4 Encoding Configuration

The V-Flex 4G (MIFARE) or V-Station 4G (iCLASS) readers may be used for encoding. This configuration should be done in System Administration.

1. In the Card Formats folder, configure a V-Smart (iCLASS) smart card format with tbe proper Wiegand access control card format. The memory configuration can be either **16KBits/16 Application Areas** or **16KBits/2 Application Areas**. The Site Key can be left blank. Card layout can be configured for encoding only primary, or primary and secondary templates.
   Or in the Card Formats folder, configure a V-Smart (MIFARE) smart card format with tbe proper Wiegand access control card format. The memory configuration can be either **16KBits/16 Application Areas** or **16KBits/2 Application Areas**. The Site Key can be left blank.
2. In the Badge Types folder, assign the card format to the badge type.
3. In the Workstations folder, on the Encoders/Scanners form, configure a V-Smart type encoder (iCLASS or MIFARE). Be sure to select the correct COM port, V-Series 4G (COM n).
4. In the Cardholders folder, click [Encode] to encode a badge. Select the smart card format type and proper V-Smart encoder, encoding an iCLASS 16K card or MIFARE 1K/4K card. Verify that badge encoding for the biometrics previously captured by the Bioscrypt device was executed successfully on the card.

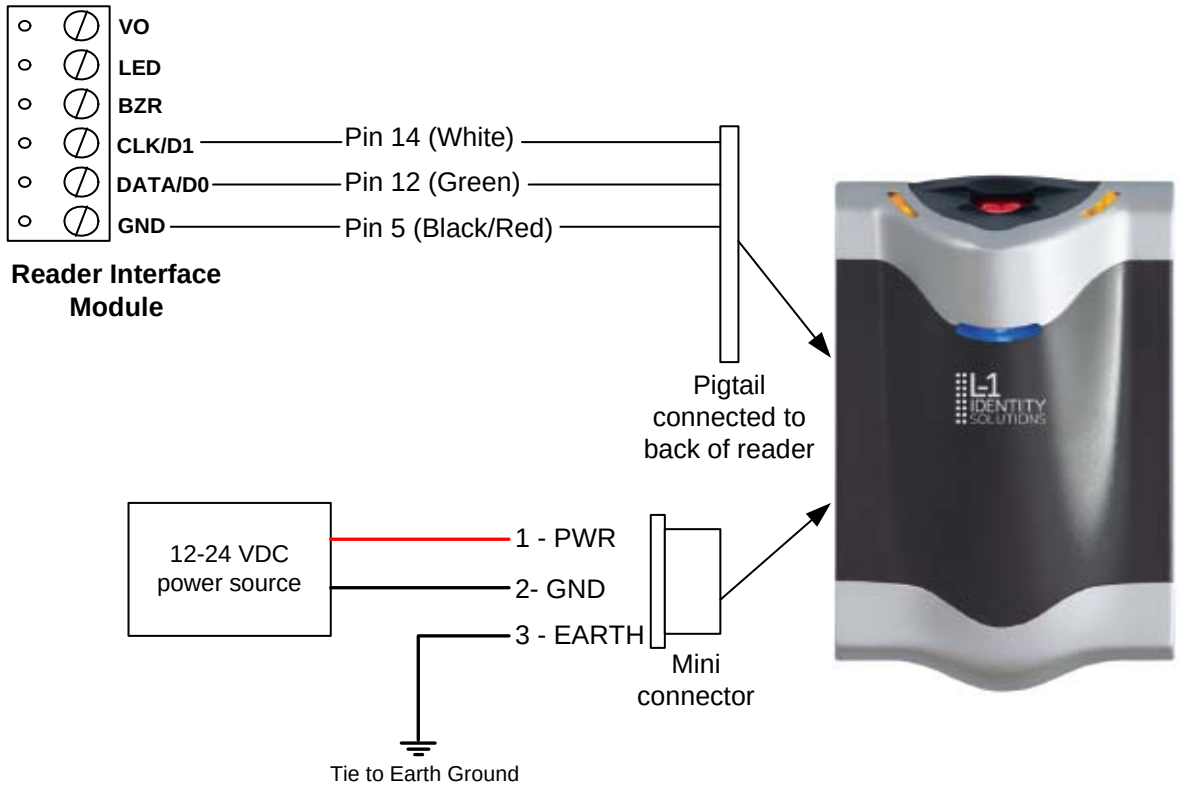
101.8.5 Wiring Verification Readers

The 4G reader can be wired to a reader interface module or biometric reader interface gateway. Be sure to assign the appropriate card format when configuring the reader in System Administration in the Readers and Doors folder. The device ID configured in SecureAdmin must match the reader number in the OnGuard configuration.

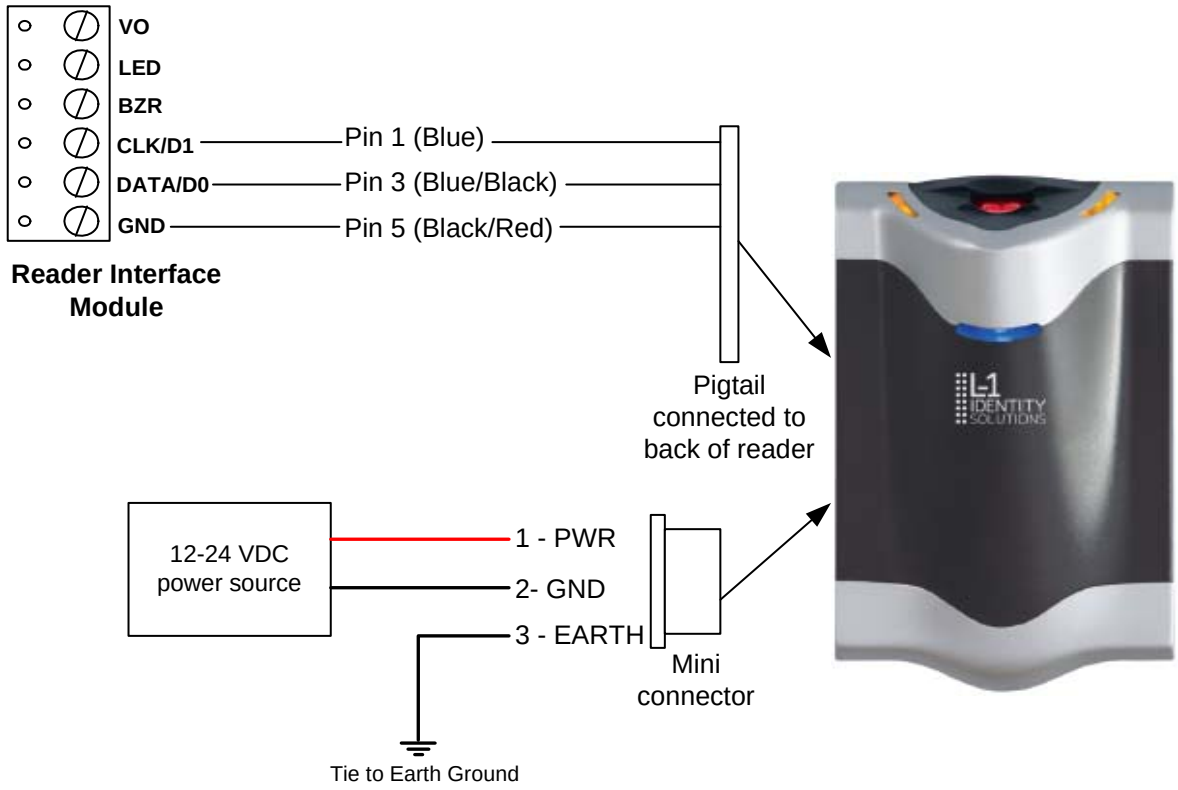
Wire pin 3 on the mini connector to earth ground. Wire pins 1 and 2 on the mini connector to the power source.

Wire the reader as follows.

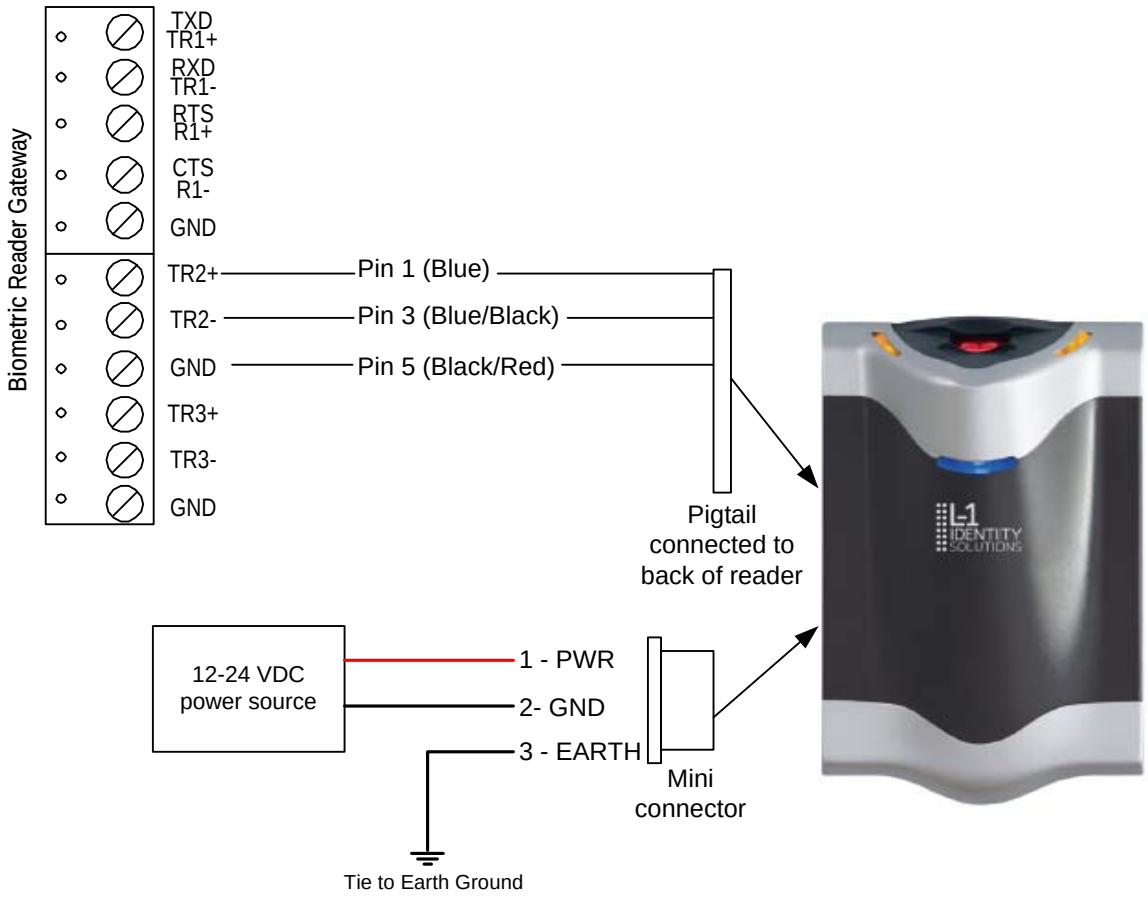
Wiring for MIFARE/iCLASS badges encoded using Bioscrypt V-Flex 4G (MIFARE) or V-Station 4G (iCLASS) connected to a reader interface module as Wiegand/prox



Wiring for fingerprint verification templates using Bioscrypt V-Flex 4G or V-Station 4G connected to a reader interface module as a Bioscrypt RS-485 alternate biometric reader



Wiring for Bioscrypt V-Flex 4G or V-Station 4G and biometric reader gateway



Note: When connecting to the LNL-500B, DIP switches 6, 7, and 8 should be on.

SCHLAGE WIRELESS READERS

102 Overview of Wireless Reader Interfaces

This installation guide is intended for use by technicians who will be installing and maintaining the Wireless Reader Gateway (LNL-500W).

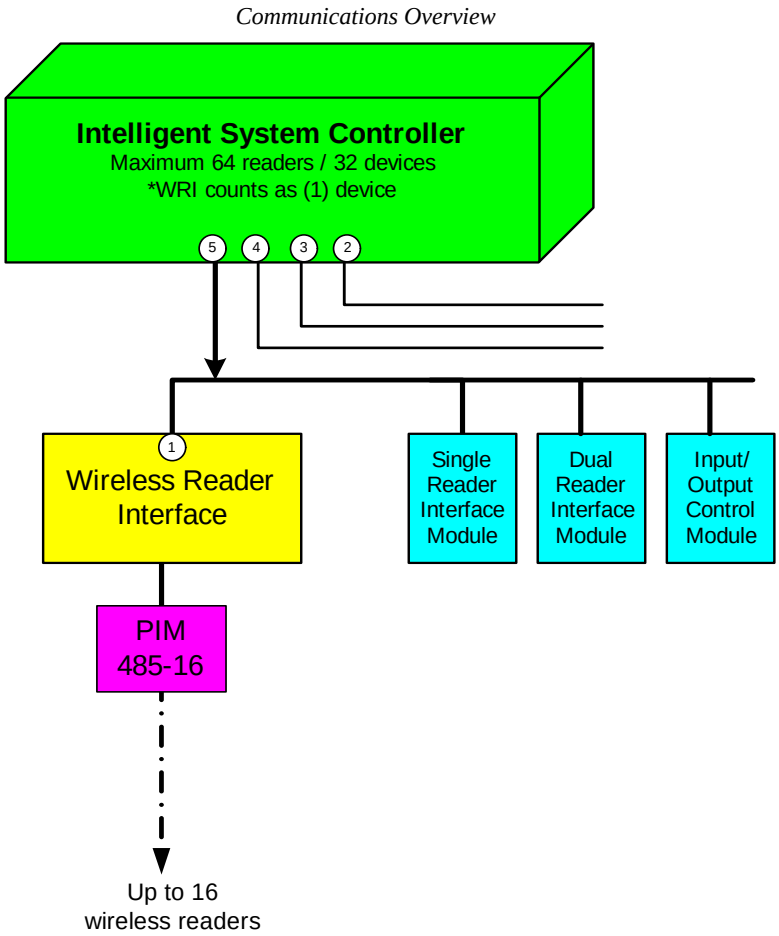
The LNL-500W interfaces with the PIM-485-16-OTD and provides real time processing gateway for wireless readers. The PIM-OTD is connected to a standard reader interface module (LNL-1300 or 1320).

102.1 Interfaces

The Wireless Reader Gateway interfaces upstream with the Intelligent System Controller. It communicates downstream with the Schlage Wireless PIM-485-16-OTD. Only one PIM can be used per wireless reader gateway. One PIM (panel interface module) supports up to 16 Schlage Wireless readers in many combinations.

The gateway can be used with any address. When configuring the reader in OnGuard, a unique reader number will be specified according to the port and address of the gateway. The first reader MUST always be present and be identified as reader number 0.

Communications Overview



103 Installation of the Gateway

To install the gateway, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the upstream host communication.
2. Wire the power input.
3. Wire the downstream device communication.
4. Cycle power to the device.

103.1 Wiring

103.1.1 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

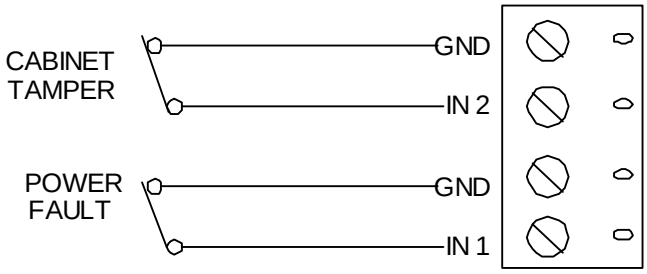
On the wireless reader gateway, there are two unsupervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the Input 2 (IN2) and Input 1 (IN1) contact terminals on the wireless reader gateway board.

Input 2 and Input 1 are both simple N/C (normally closed) contact closure monitors.

Wire the Input 2 and Input 1 contacts using twisted pair cable, 30 ohms maximum. (No EOL resistors are required.)

Note: If either of these inputs is not used, a shorting wire should be installed.

Unsupervised Alarm Input Wiring.



103.1.2 Upstream Host Communication

The wireless reader gateway uses Port 1 to communicate to the ISC. Port 1 should be wired as 2-wire RS-485 interface for multi-drop or extended distance communication.

For RS-485 communication, the following type of RS-485 cable is required: 24 AWG (minimum) twisted pair (with shields). 2 twisted pair RS-485 cable configuration should be used. The RS-485 cable should be

no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102, West Penn, or equivalent.) The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

RS-485 Communications

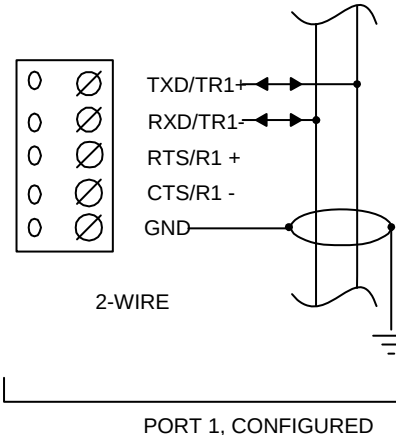
The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multiport communications on a bus transmission line. It allows for high-speed data transfer over extended distance (4000 feet, 1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances End-of-line (EOL) termination is required.

Belden (24 gauge wire – (7x32) Stranded Conductors – Polyethylene Insulated).

Belden Wire Specifications

Trade Number UL NEC Type CSA Certification	Number of Pairs	Nominal D.C. R. Conductor	Shield	Nominal Impedance (Ohms)	Nominal Capacitance	
					pF/feet	pF/meter
9841 NEC CM CSA	1	24.0 ohms/M 78.7 ohms/ km	3.35 ohms/M 11.0 ohms/K	120	12.8	42
9842 NEC CM CSA	2	24.0 ohms/M 78.7 ohms/ km	2.2 ohms/M 7.2 ohms/K	120	12.8	42
88102 NEC CMP CSA	2	24.0 ohms/M 78.7 ohms/ km	15.5 ohms/M 50.9 ohms/km	100	12.95	42

Upstream Host Communication Wiring (Port 1)



Wire Configuration – Switch #5 must be off for all panels in this configuration.

103.1.3 Power

The wireless reader gateway accepts either a 12 VDC or 12 VAC ± 15% power source for its power input. The power source should be located as close to the wireless reader gateway as possible.

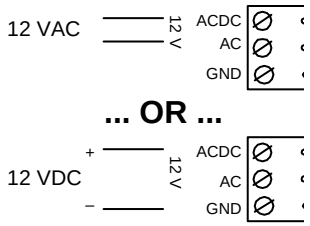
Wire the power input with 18 AWG (minimum) twisted pair cable.

For AC power sources, the following lines are required: AC Line (L), AC Neutral (N). These lines must not be interchanged. A 400 mA RMS current is required for AC power supplies.

For DC power sources, isolated and non-switching, regulated DC power is required. A 250 mA current is required for DC power supplies.

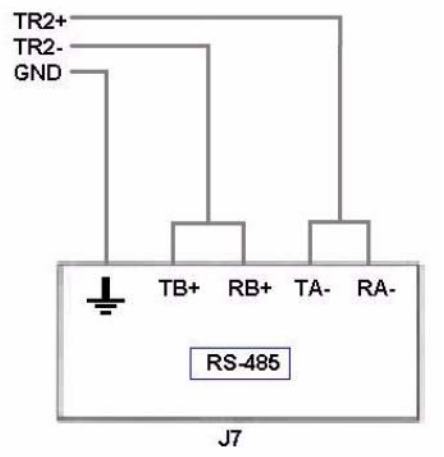
Note: If using a 12 VDC power source *(preferred)*, be sure to observe polarity.

Power Source Wiring



103.1.4 Downstream Device Communication

The wireless reader gateway can be configured to communicate downstream with one PIM-485-16-OTD. Each PIM-485-16-OTD supports up to 16 wireless readers. Set the PIM-485-16-OTD to address 0. Connect the two as follows:



Termination

The typical recommendation calls for termination at each end of the line. The link between the LNL-500W and the Schlage Wireless devices is fairly short. There may be a need for termination in some unusual cases.

Notes:
- The wireless reader gateway can be located anywhere along the RS-485 line.
- Remove the RS-485 terminator for each device that is not an end-of-line device.

104 Configuration

The wireless reader gateway board contains 8 DIP switches and 11 jumpers that must be configured for your system.

104.1 Setting DIP Switches

The following chart describes the use of each DIP switch.

DIP SWITCH	USED TO CONFIGURE:
1, 2, 3, 4, 5	Interface address
6, 7	Communication baud rate
8	Downstream baud rate (varies depending on firmware type)

104.1.1 Interface Address

To configure the interface address, set DIP switches according to the following table.

ADDRESS	DIP SWITCH				
	1:	2:	3:	4:	5:
0	off	off	off	off	off
1	ON	off	off	off	off
2	off	ON	off	off	off
3	ON	ON	off	off	off
4	off	off	ON	off	off
5	ON	off	ON	off	off
6	off	ON	ON	off	off
7	ON	ON	ON	off	off
8	off	off	off	ON	off
9	ON	off	off	ON	off
10	off	ON	off	ON	off
11	ON	ON	off	ON	off
12	off	off	ON	ON	off
13	ON	off	ON	ON	off
14	off	ON	ON	ON	off
15	ON	ON	ON	ON	off

ADDRESS	DIP SWITCH				
	1:	2:	3:	4:	5:
16	off	off	off	off	ON
17	ON	off	off	off	ON
18	off	ON	off	off	ON
19	ON	ON	off	off	ON
20	off	off	ON	off	ON
21	ON	off	ON	off	ON
22	off	ON	ON	off	ON
23	ON	ON	ON	off	ON
24	off	off	off	ON	ON
25	ON	off	off	ON	ON
26	off	ON	off	ON	ON
27	ON	ON	off	ON	ON
28	off	off	ON	ON	ON
29	ON	off	ON	ON	ON
30	off	ON	ON	ON	ON
31	ON	ON	ON	ON	ON

104.1.2 Upstream Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table. This feature controls the baud rate for upstream communication.

BAUD RATE	DIP SWITCH	
	6:	7:
38400 bps	ON	ON
19200 bps	off	ON
9600 bps	ON	off
2400 bps	off	off

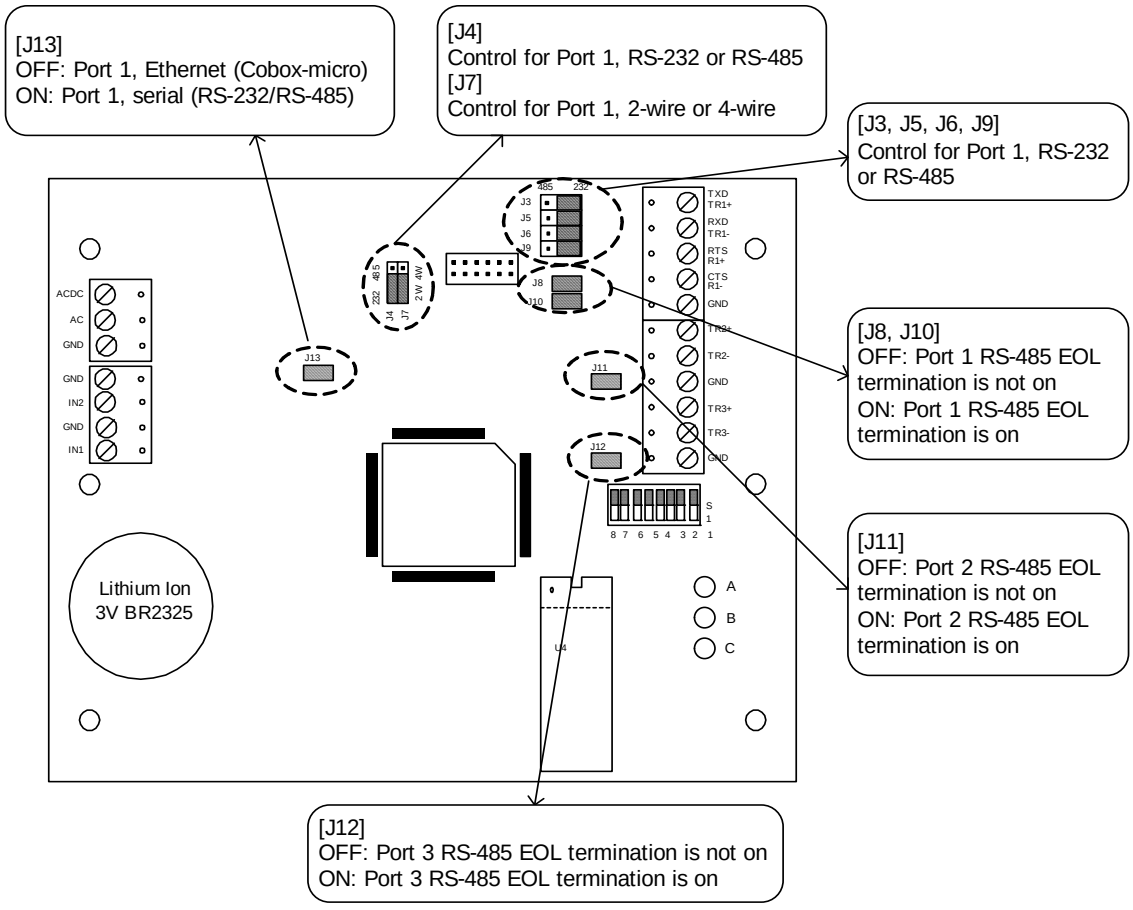
104.1.3 Downstream Baud Rate

DIP switch 8 controls the downstream baud rate.

DIP SWITCH 8:	Baud rate
off	9600 bps
ON	not supported

104.2 Installing Jumpers

The following diagram describes the use of each jumper on the board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.



104.3 Firmware

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

105 Schlage Wireless Configuration

This section contains information for installing and wiring the PIM-485-16-OTD or the PIM-OTD.

105.1 PIM-485-16-OTD

The RS-485 address of the PIM-485-16-OTD needs to be set to 0. This may also be referred to as the 'PIM Addr."

Each reader communicating with the PIM-485-16-OTD also has an address. This range cannot exceed 16 addresses. The first address must be set to 0. The PIM-485-16-OTD should be configured for as "Addr Lo" of 0 and "Addr Hi" of 15.

105.2 Configuration and Demonstration Tool

The Configuration and Demonstration Tool (CDT) is a software program used to configure the PIM-485-16-OTD and readers. It can be obtained from http://www.ir-swa.com/demo/devsite.shtml. CDT requires Sun Java Runtime Environment. For more information, refer to the Web site.

Note: An RS-232 and RS-485 cannot be connected simultaneously. If you are using an RS-232 connection (standard RS-232 cable) to configure, any RS-485 connection must be disconnected for the CDT to operate properly. Remember to reconnect the RS-485 when you are done configuring.

1. When running the CDT, select the serial port you are using before putting the PIM-485-16-OTD into the CDT mode. This is done on the PIM Status tab.
2. Once the PIM-485-16-OTD is powered and connected to the computer, and the CDT is running, press and hold either the SA or SB button on the PIM-485-16-OTD while pressing and releasing the PIM reset switch S3.
3. Once LEDs CR7 and CR10 start to flash, the SA/SB switch can be released. This places the PIM-485-16-OTD in the CDT communication mode. Once the PIM-485-16-OTD is in CDT mode, a status message will be displayed (example: Recognition PIM Connected on COM1).
   If the CDT is shut down and restarted, the PIM-485-16-OTD must be reset as indicated above to return to the CDT communication mode.
4. To change the PIM address and the address range you will need to go to the Addresses tab. Set the proper Addr Lo, Addr Hi, and Pim Addr values as follows:
   - Addr Lo: 0
   - Addr Hi: 15
   - Pim Addr: 0
5. Click [Set].
6. The Link tab is used to link a wireless device to the PIM. You must first put the PIM and the wireless device into link mode. On the PIM, press and hold the link button (SA/SB). Press and release the reset switch.
7. In CDT, select the panel (door) to link (0-15).

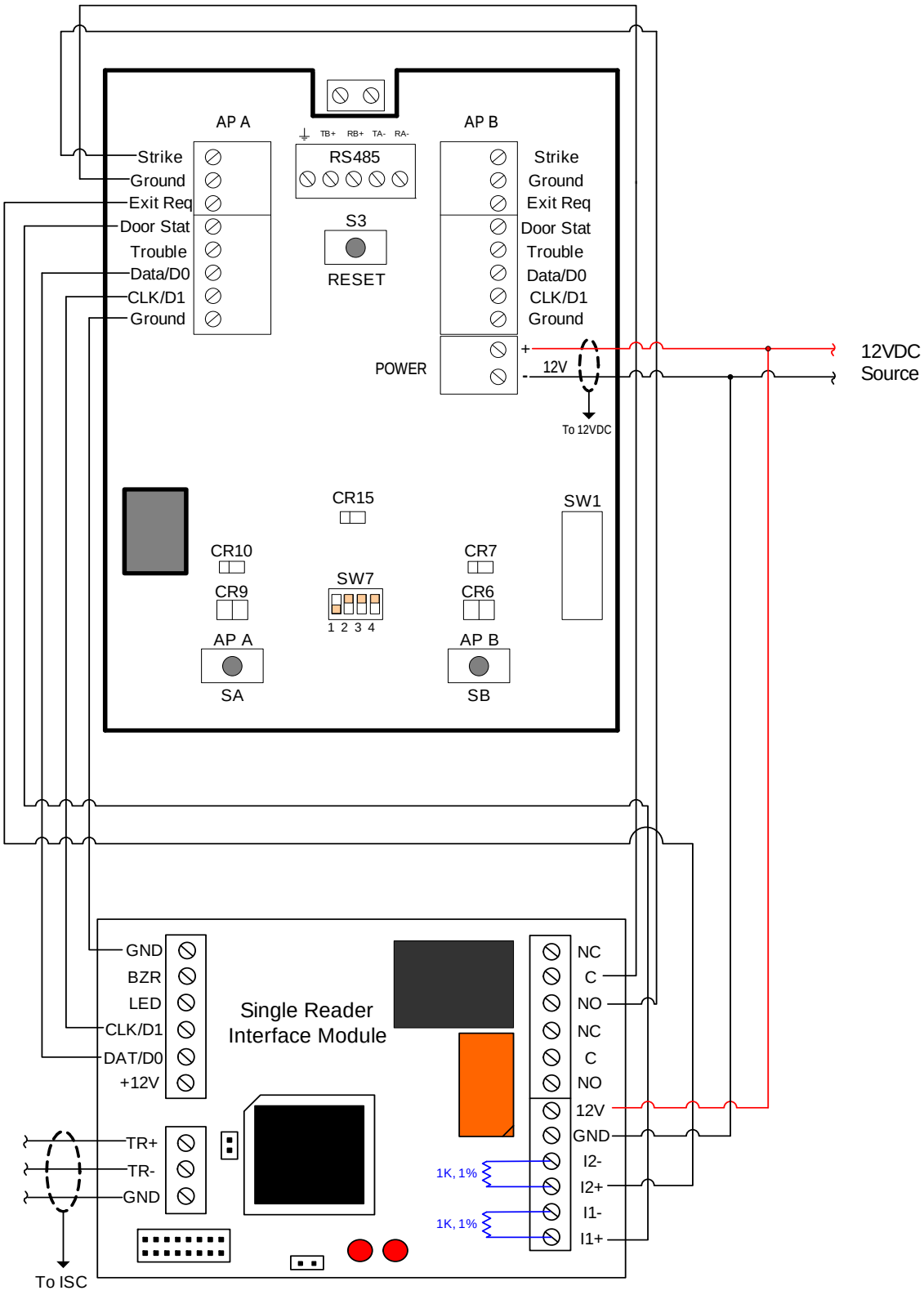
8. Click [Start] to put the PIM in link mode. Click [Stop] to take the PIM out of link mode.
   The link mode will be terminated when a link is successfully established, or when 30 minutes have elapsed.

To put the wireless device into link mode, refer to the manufacturer documentation. The instructions vary for each model. Once the address and link are established, you may proceed to configure the other properties using CDT.

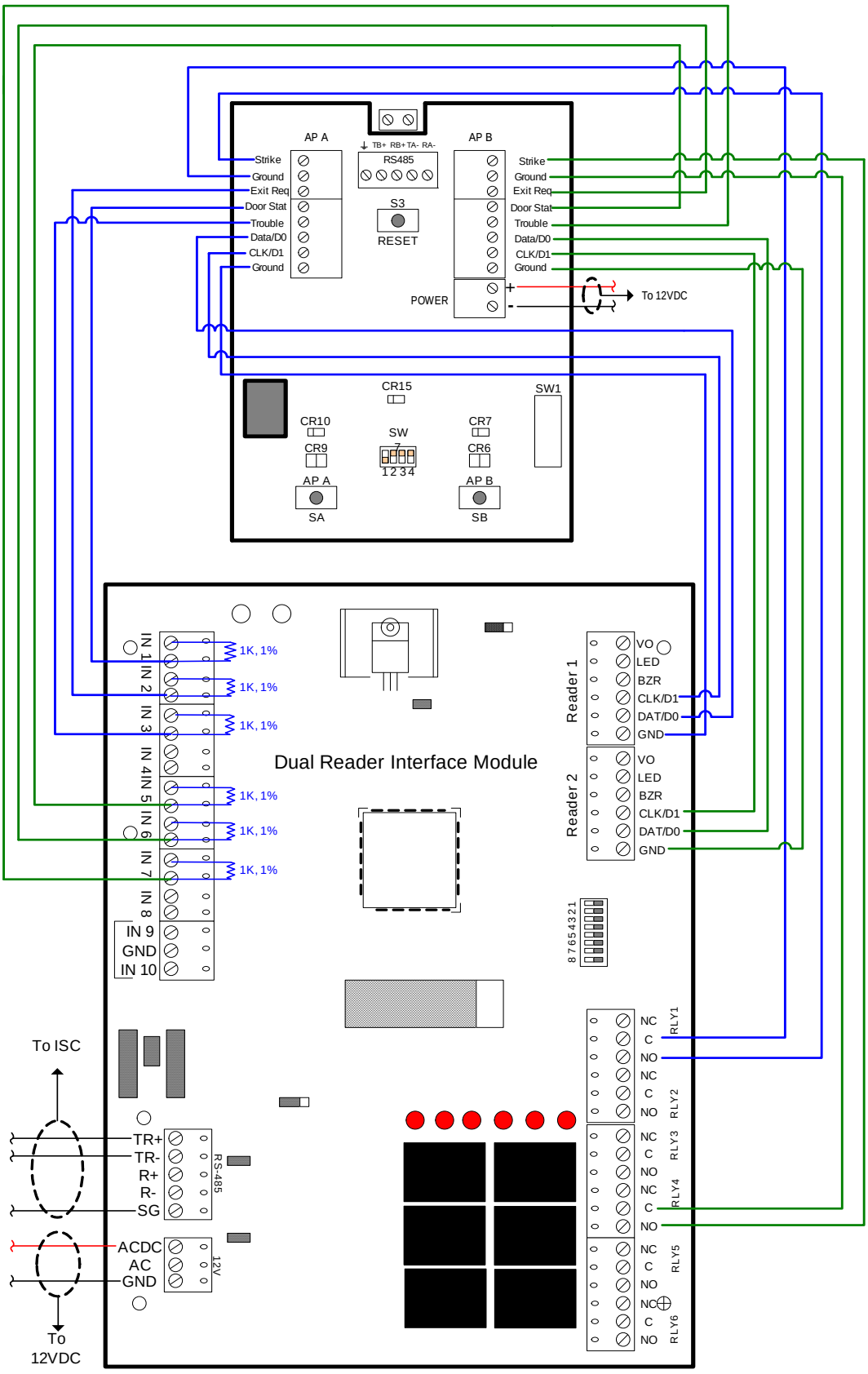
105.3 PIM-OTD

Use the following diagrams to wire the PIM-OTD to single/dual reader interface module.

Wiring the LNL-1300 and PIM-OTD



Wiring the LNL-1320 and the PIM-OTD



106 Readers

Schlage Wireless access readers are designed to eliminate the wiring from doors to panels. This minimizes the wiring required at or around the door. OnGuard supports a number of integrated locks and readers. Once the PIM-485-16-OTD is connected, Schlage Wireless readers may be used. For more information, refer to the Schlage Wireless Access System documentation.

The following Schlage Wireless Access Point Modules are supported:

- **PIM-OTD** Panel Interface Module
- **WRI-OTD** Schlage Wireless Reader Interface
- **MIRL** Modular Integrated Reader Lock
- **IRL** Integrated Reader Lock
- **WPR** Schlage Wireless Portable Reader
- **ANT-REM** Remote antenna for PIMs
- **PIM-485-16-OTD** RS-485 panel interface module for up to 16 readers

106.1 Use with the LNL-2020W

To use a WRI with an LNL-2020W and a wireless reader, the LNL-2020W must be set to format 3 (DIP switches 3 and 4 are turned on).

In System Administration, configure the reader as Mag w/ Wiegand output.

106.2 OnGuard Configuration

The Schlage Wireless readers are configured similar to other readers in System Administration. Since these readers are configured on a gateway, specify a reader number for these readers that corresponds to the address on the gateway. The reader at address 0 (reader number 0) must be the first reader configured.

Be sure to select the proper reader type for your configuration: either **Schlage Wireless Access (Mag w/ Wiegand output)** or **Schlage Wireless Access (Wiegand/Prox)**.

106.2.1 Strike Time

The strike times cannot be configured from OnGuard; these would need to be configured using the Schlage Wireless software if you wish to have different values besides the default values. However, the strike time in OnGuard MUST be configured to match the setting in the CDT. The valid range for the strike time for Schlage Wireless is from 1 to 255 with a default of 3 seconds.

106.2.2 Reported Trouble Alarms

These alarms are specific to Schlage Wireless readers:

- **Loss of communications.** A break in RF communications can be detected within minutes, even seconds sometimes.

- **Low power (battery life).** When low power has been indicated, the reader can continue to function for another 5000 to 10,000 swipes.

- **Tamper at the doors.** This means that the reader has been removed.

- **Stalled motor.** The lock motor has stopped running.

107 Specifications

The LNL-500W is for use in low voltage, class 2 circuits only.

- Primary Power: (DC or AC)
  - DC input: 12 VDC ± 10%. 250 mA
  - AC input: 12 VAC ± 15%. 400 mA RMS
- Memory and Clock Backup: 3 V lithium (does not apply to this hardware)
- Communication Ports:
  - Port 1: RS-232 or RS-485, 2400 to 38400 bps async
  - Ports 2-3: RS-485 (2-wire), 2400 to 38400 bps async
- Inputs:
  - Cabinet Tamper Monitor: unsupervised, dedicated
  - Power Fault Monitor: unsupervised, dedicated
- Wire Requirements:
  - Power: 1 twisted pair, 18 AWG
  - RS-485: 24 AWG twisted pair(s) with shield, 4000 feet (1219 m) maximum
  - RS-232: 24 AWG, 25 feet (7.6 m) maximum
  - Alarm Input: twisted pair, 30 ohms maximum
- Environmental:
  - Temperature: Operating: 0° to 70° C (32° to 158° F)
    Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimension: 6 x 5 x 1 in. (152 x 127 x 25 mm)
  - Weight: 8 oz. (290 g) nominal
- Data Memory: 512 KB
- Certifications:
  - UL294 Listed
  - CE marking
  - RoHS compliant

Note: These specifications are subject to change without notice.

SCHLAGE WIRELESS LOCKS

108 Overview of Wireless Lock Interfaces

This installation guide is intended for use by technicians who will be installing and maintaining the Wireless Reader Gateway (LNL-500W).

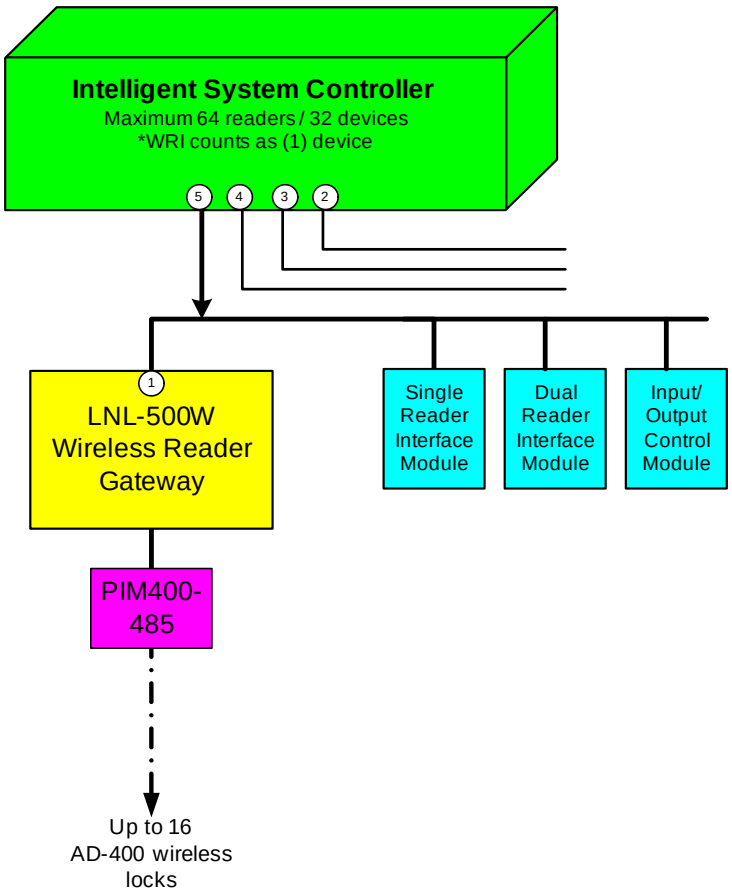
The LNL-500W interfaces with the Schlage Panel Interface Module (PIM400-485) and provides a real time processing gateway for Schlage AD-400 wireless locks.

108.1 Interfaces

The LNL-500W interfaces upstream with the Intelligent System Controller. It communicates downstream with the PIM400. Only one PIM can be used per LNL-500W. One PIM supports up to 16 AD-400 locks in many combinations. For more information, refer to the sections PIM400-485 on page 591 and AD-400 Wireless Locks on page 593.

The LNL-500W can be used with any address. When configuring the reader in OnGuard, a unique reader number will be specified according to the port and address of the LNL-500W. The first reader MUST always be present and identified as reader number 0.

Communications Overview



109 Installation of the LNL-500W

To install the LNL-500W, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the upstream host communication.
2. Wire the power input.
3. Wire the downstream device communication.
4. Cycle power to the device.

109.1 Wiring

109.1.1 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

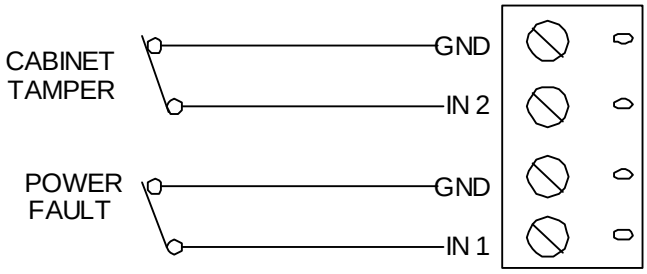
On the LNL-500W, there are two unsupervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the Input 2 (IN2) and Input 1 (IN1) contact terminals on the LNL-500W board.

Input 2 and Input 1 are both simple N/C (normally closed) contact closure monitors.

Wire the Input 2 and Input 1 contacts using twisted pair cable, 30 ohms maximum. (No EOL resistors are required.)

Note: If either of these inputs is not used, a shorting wire should be installed.

Unsupervised Alarm Input Wiring.



109.1.2 Upstream Host Communication

The LNL- 500W uses Port 1 to communicate to the ISC. Port 1 should be wired as 2-wire RS-485 interface for multi-drop or extended distance communication.

For RS-485 communication, the following type of RS-485 cable is required: 24 AWG (minimum) twisted pair (with shields). 2 twisted pair RS-485 cable configuration should be used. The RS-485 cable should be

no longer than 4000 feet [1219 m], 100 ohms maximum (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102, West Penn, or equivalent.) The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

RS-485 Communications

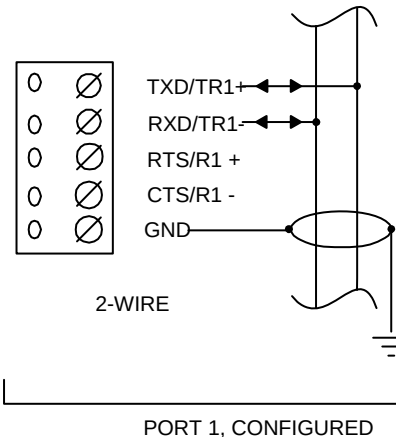
The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multiport communications on a bus transmission line. It allows for high-speed data transfer over extended distance (4000 feet, 1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances End-of-line (EOL) termination is required.

Belden (24 gauge wire – (7x32) Stranded Conductors – Polyethylene Insulated).

Belden Wire Specifications

Trade Number UL NEC Type CSA Certification	Number of Pairs	Nominal D.C. R. Conductor	Shield	Nominal Impedance (Ohms)	Nominal Capacitance	
					pF/feet	pF/meter
9841 NEC CM CSA	1	24.0 ohms/M 78.7 ohms/km	3.35 ohms/M 11.0 ohms/K	120	12.8	42
9842 NEC CM CSA	2	24.0 ohms/M 78.7 ohms/km	2.2 ohms/M 7.2 ohms/K	120	12.8	42
88102 NEC CMP CSA	2	24.0 ohms/M 78.7 ohms/km	15.5 ohms/M 50.9 ohms/km	100	12.95	42

Upstream Host Communication Wiring (Port 1)



Wire Configuration – DIP switch 5 is used for Flow Control. Switch 5 must be OFF for all ISCs in this configuration.

109.1.3 Power

The LNL-500W accepts either a 12 VDC or 12 VAC ± 15% power source for its power input. The power source should be located as close to the LNL-500W as possible.

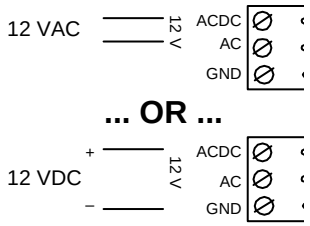
Wire the power input with 18 AWG (minimum) twisted pair cable.

For AC power sources, the following lines are required: AC Line (L), AC Neutral (N). These lines must not be interchanged. A 400 mA RMS current is required for AC power supplies.

For DC power sources, isolated and non-switching, regulated DC power is required. A 250 mA current is required for DC power supplies.

Note: If using a 12 VDC power source *(preferred)*, be sure to observe polarity.

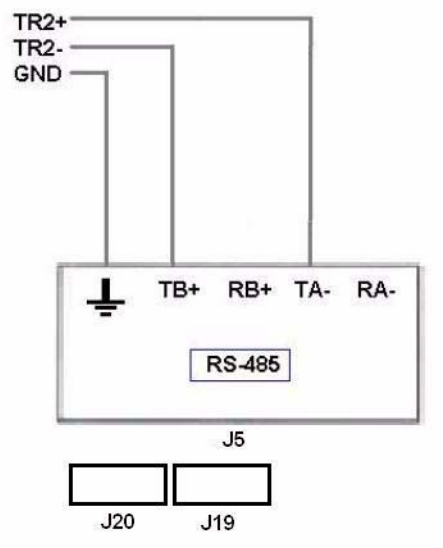
Power Source Wiring



109.1.4 Downstream Device Communication

The LNL-500W can be configured to communicate downstream with one PIM400. Set the PIM400 to address 0.

Connect the two devices as follows:



Important: Make sure you connect from TR2+ to TA- and from TR2- to TB+. This is different than all other panel types.

Important: Jumpers 19 & 20 must be ON.

Termination

The typical recommendation calls for termination at each end of the line. The link between the LNL-500W and the Schlage wireless devices is fairly short. There may be a need for termination in some unusual cases.

Notes: The LNL-500W can be located anywhere along the RS-485 line.

For Port 2, you must always remove the RS-485 terminator (J11) for each device that is not an end-of-line device.

110 Configuration

The LNL-500W board contains 8 DIP switches and 11 jumpers that must be configured for your system.

110.1 Setting DIP Switches

The following chart describes the use of each DIP switch.

DIP SWITCH	USED TO CONFIGURE:
1, 2, 3, 4, 5	Interface address
6, 7	Communication baud rate
8	Downstream baud rate (varies depending on firmware type)

110.1.1 Interface Address

To configure the interface address, set DIP switches according to the following table.

ADDRESS	DIP SWITCH				
	1:	2:	3:	4:	5:
0	off	off	off	off	off
1	ON	off	off	off	off
2	off	ON	off	off	off
3	ON	ON	off	off	off
4	off	off	ON	off	off
5	ON	off	ON	off	off
6	off	ON	ON	off	off
7	ON	ON	ON	off	off
8	off	off	off	ON	off
9	ON	off	off	ON	off
10	off	ON	off	ON	off
11	ON	ON	off	ON	off
12	off	off	ON	ON	off
13	ON	off	ON	ON	off
14	off	ON	ON	ON	off
15	ON	ON	ON	ON	off
16	off	off	off	off	ON

ADDRESS	DIP SWITCH				
	1:	2:	3:	4:	5:
17	ON	off	off	off	ON
18	off	ON	off	off	ON
19	ON	ON	off	off	ON
20	off	off	ON	off	ON
21	ON	off	ON	off	ON
22	off	ON	ON	off	ON
23	ON	ON	ON	off	ON
24	off	off	off	ON	ON
25	ON	off	off	ON	ON
26	off	ON	off	ON	ON
27	ON	ON	off	ON	ON
28	off	off	ON	ON	ON
29	ON	off	ON	ON	ON
30	off	ON	ON	ON	ON
31	ON	ON	ON	ON	ON

110.1.2 Upstream Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table. This feature controls the baud rate for upstream communication.

BAUD RATE	DIP SWITCH	
	6:	7:
38400 bps	ON	ON
19200 bps	off	ON
9600 bps	ON	off
2400 bps	off	off

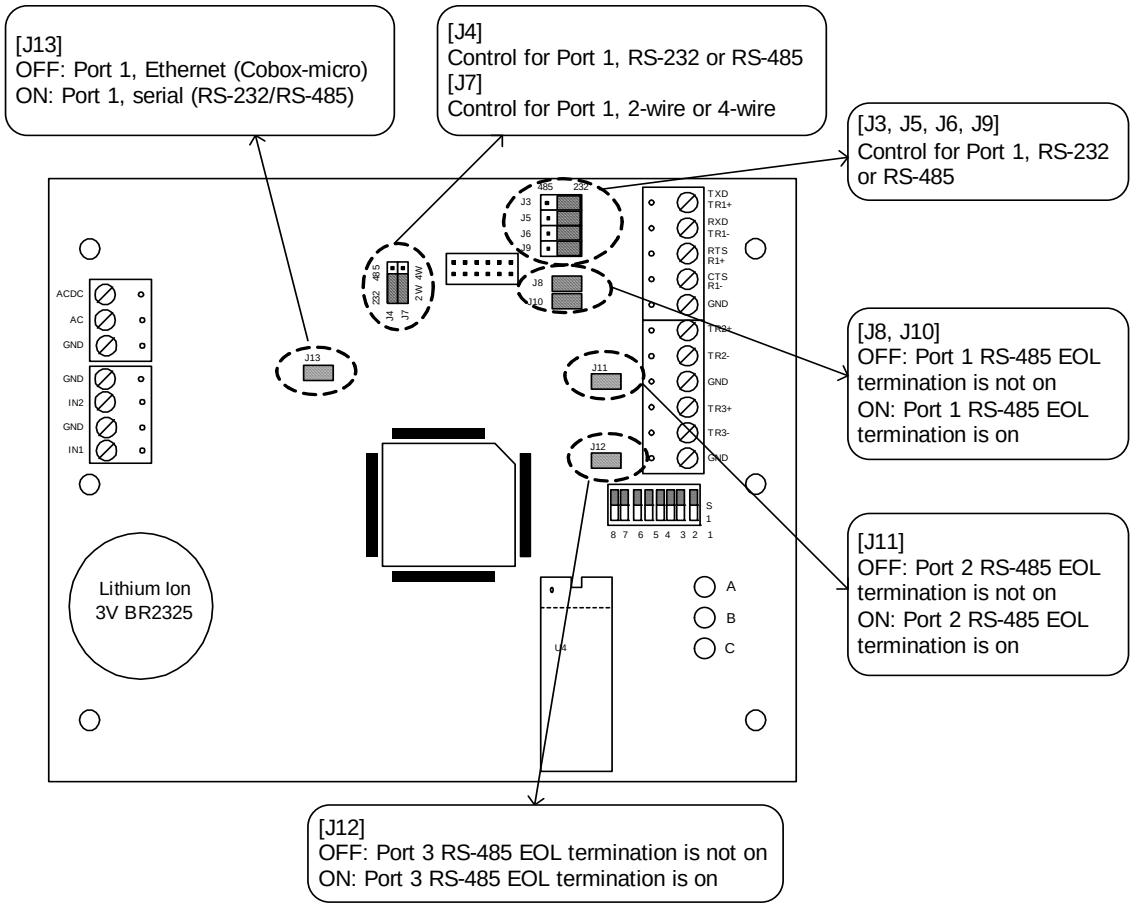
110.1.3 Downstream Baud Rate

DIP switch 8 controls the downstream baud rate.

DIP SWITCH 8:	Baud rate
off	9600 bps
ON	not supported

110.2 Installing Jumpers

The following diagram describes the use of each jumper on the board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.



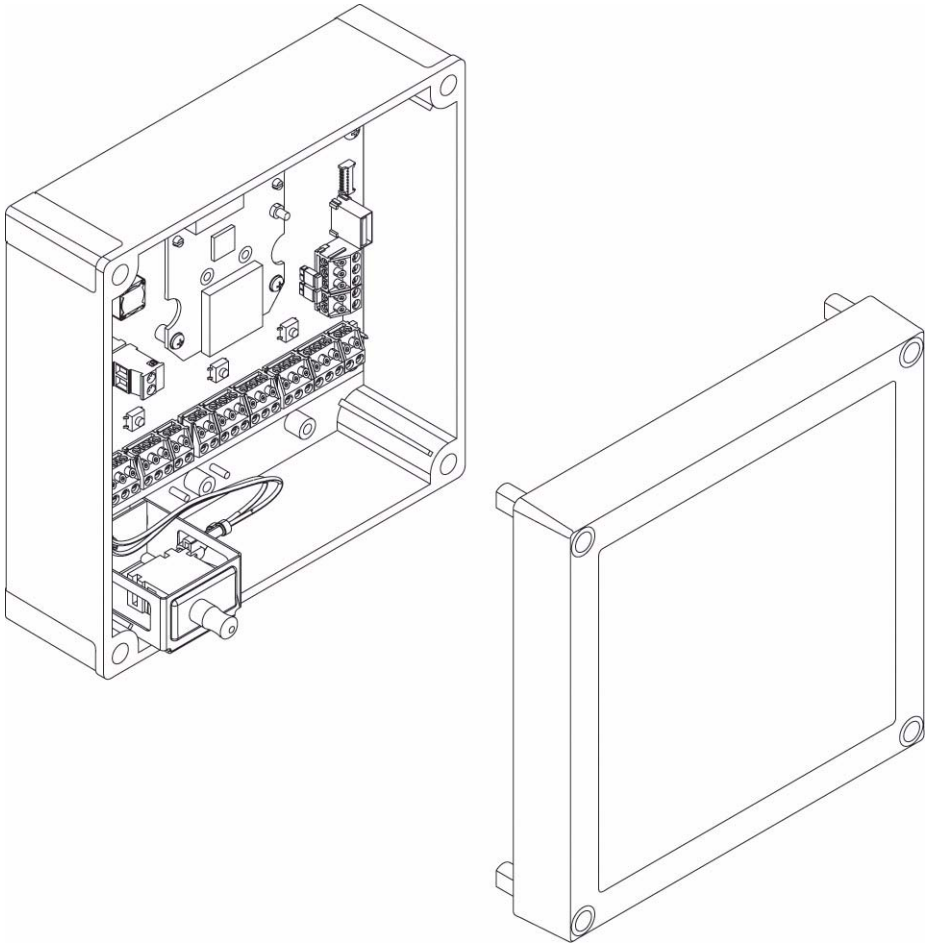
110.3 Firmware

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

111 Schlage Wireless Configuration

This section contains information for installing and wiring the PIM400-485 Panel Interface Module.

111.1 PIM400-485



111.2 Configure the PIM400-485 and AD-400 Wireless Lock Range Addresses

1. Connect the HHD to the PIM400.

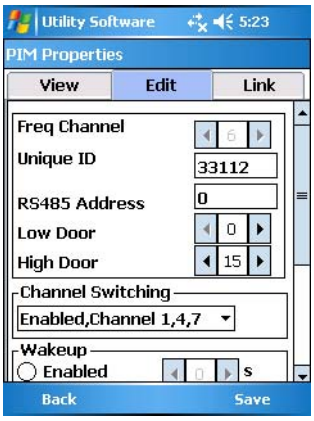
2. On the HHD, log onto SUS.

3. On the Main Screen, select **Device Options**.

4. On the Device Options screen, click [PIM Properties].

5. The **RS-485 Address** of the PIM400 must be set to 0 (the default). Each AD-400 wireless lock communicating with the PIM400 also has an address. The range of available lock addresses cannot

exceed 16. The first address must be set to 0. The PIM400 should be configured for a **Low Door** address of 0 and a **High Door** address of 15.



111.3 AD-400 Wireless Locks

The Schlage AD-400 locking system combines the hardware components required for a complete access control system that includes the wireless lock, credential reader, request-to-enter and request-to-exit sensors, door position switch, and other features. In addition, the wireless AD-400 lock has built-in intelligence that allows you to monitor the status at each of your doors in OnGuard via Alarm Monitoring. For more information, refer to the Alarm Monitoring User Guide.

- Communications:
  - Uses 900 MHz frequency to communicate with the PIM400-485
  - Range: Up to 200 feet with obstructions (normal building construction); up to 1000 feet with clear line-of-site
- Wake-up feature:
  - When enabled, causes the remote, battery-powered AD-400 wireless locks linked to the PIM400 to respond within seconds to a centralized lockdown or unlock command from the access control panel.
  - When disabled, the wireless locks will respond only during their heartbeat, which could result in a delay. Wake-up is configurable from 10 - 1 second heartbeat intervals. When Wake-up is used in critical applications, Dynamic Channel Switching (DCS) must also be enabled to avoid potential RF interference by automatically changing channels.

In addition, the AD-400 lock has a number of built-in features that are configurable in the field.

- Card technologies:
  - Magnetic Stripe
  - Proximity (125 kHz)
  - Smart Card (13.56 MHz)
  - Multi-technology: 125 kHz proximity and 13.56 MHz smart card
- Smart card and multi-technology ISO Standards: 15693 and 14443
- Functions:
  - Classroom/Storeroom
  - Office (Only available when linked via the PIM400-485.)
  - Privacy (Only available when linked via the PIM400-485.)
  - Apartment (Only available when linked via the PIM400-485.)

Note: Classroom/Storeroom and Office functions are not available with Mortise Deadbolt option. To ensure safety, all functions always allow for free egress.

111.4 Handheld Device (HHD)

A Windows CE-based handheld device (HHD) installed with Schlage Utility Software is used to configure the PIM's links and outputs, transfer data files between the access control software and the AD-400 locks and controllers. For detailed information about the HHD, refer to the Schlage Utility Software User Guide on the Schlage web site: http://www.schlage.com/support.

Use the HHD with the HHUSB cable to perform the following operations:

- At the PIM400-485:
  - Modify door properties
  - Modify PIM400-485 properties
  - Update firmware
  - Perform diagnostics
- At the AD-400 lock:
  - Modify lock properties
  - Modify door properties
  - Update firmware
  - Couple the HHD to the AD-400 lock
  - Set time and date
  - Change lock class

111.5 Synchronization Software

Synchronization software is required to interface and synchronize with the HHD device on your computer. You can use it to install or update software applications on your HHD device. When installed and configured properly, files will be automatically transferred between your computer and the HHD device when the HHD device is connected to the computer.

Note: This software may already be installed on your computer.

111.5.1 Download and Install Synchronization Software

1. Browse to www.microsoft.com/windowsmobile/en-us/downloads.
2. Download the software that matches your operating system.
   - For Windows XP or Windows 2000, download Microsoft ActiveSync.
   - For Windows 7 or Windows Vista, download Microsoft Windows Mobile Device Center.
3. Run the installer and follow the on-screen instructions.

111.5.2 Configure the Synchronization Software

Microsoft ActiveSync:

1. Connect the HHD device to the computer's USB port. The Synchronization Setup Wizard is displayed.
2. Click [Next].
3. Deselect the **Synchronize directly with a server running Microsoft Exchange** check box. Click [Next].
4. Deselect all check boxes except **Files**.
5. On the File Synchronization window, click [OK]. A new folder will be created on the computer to store the synchronized files.
6. Click [Finish].

Microsoft Windows Mobile Device Center:

1. Open the Windows Mobile Device Center from the computer.
2. Connect the HHD device to your computer's USB port.
3. Click **Setup your device**.
4. Deselect all check boxes except **Files**. Click [Next].
5. Type a name for the device in the **Device name** field.
6. Click [Set Up].

111.5.3 Locate the Synchronization Folder

The synchronization software looks in this folder for files that should be synchronized with the HHD device. When you configure your access control software, you need to know the location of this file on your computer.

111.6 Install the Schlage Utility Software (SUS)

The Schlage Utility Software (SUS) is a software application that runs on a handheld device (the HHD). From the SUS, you can configure, edit, and program the PIM400 and AD-400 locks.

Prerequisite: Synchronization software must be installed and configured in order to install or update the SUS. For more information, please refer to Download and Install Synchronization Software on page 595 and Configure the Synchronization Software on page 595.

1. Connect the HHD to your computer via the USB port.
   a. Locate the HH-USB cable that came in the box with the handheld device. Insert the USB end into the computer's USB port.
   b. Power on the HHD.
   c. Insert the other end of the cable into the bottom of the HHD.
2. Install or update the Schlage Utility Software. Although the SUS is already installed on your HHD, you should update it to ensure you have the latest version of the software.

a. Download the installer (Schlage Utility Setup Ver x.x.xx.exe; the version may vary) from www.schlage.com/support.
b. Make sure you have already installed and configured the synchronization software.
c. Make sure the HHD is connected to the computer's USB port and is powered on.
d. Launch the installer.
e. Follow the on-screen instructions. The synchronization software will automatically transfer the software to the HHD.

Note: When updating Schlage Utility Software all passwords are reset to their defaults.

For more information, refer to the Schlage web site.

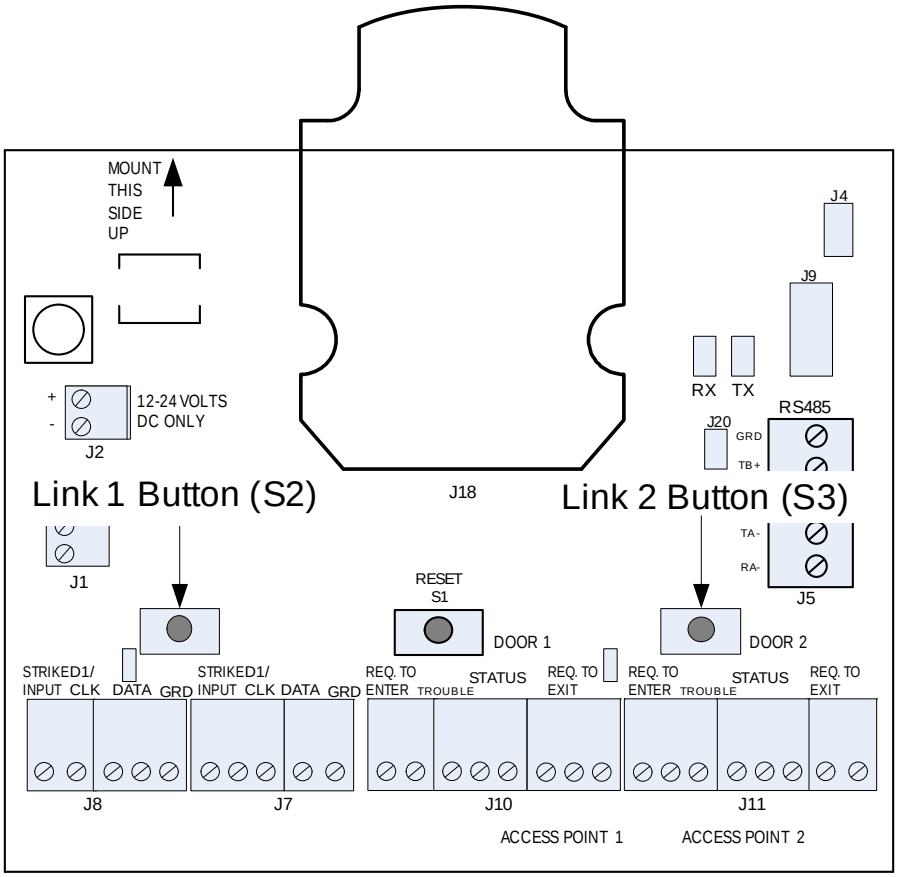
111.7 Link the Wireless Lock to the PIM

The Link tab is used to link a wireless lock to the PIM. Before performing any other operation, you must first place both the PIM and the wireless lock into Link mode.

111.7.1 Use the HHD to Couple to the PIM400

1. Remove the PIM400 cover.
2. Connect the HHD to the PIM400 using the HH-USB cable. The PIM400 will be displayed on the HHD screen.
3. On the HHD, select **Device Options**.

4. On the PIM400, press and hold the LINK 1 button (S2), and then press the LINK 2 (S3) button three (3) times.



5. Continue holding the LINK1 (S2) button (at least 15 seconds) until communication is established. This will be indicated when the PIM device name is displayed on the SUS main screen and the LED begins to flash red. This places the PIM400 in the SUS communication mode. A status message will be displayed (example: PIM Connected on COM1).

Note: If the SUS is closed and restarted, the PIM400 must be reset as indicated in this procedure to return to the SUS communication mode.

6. On the HHD, select **Couple HHD to Device**. When coupling is successful, a message is displayed on the HHD screen.

Note: When the HHD is coupled with the PIM any previously connected locks will lose communication with OnGuard. The lock is displayed with a yellow "X" in Alarm Monitoring and shown as "Gateway online, PIM Offline."

111.7.2 Place the Lock in Link Mode

While PIM is in Link mode (up to 30 minutes), place the lock into Link mode. (The PIM will automatically exit Link mode once linking is complete.)

1. Open lock's back cover.
2. Open the door.
3. Push down the lock’s inside handle and then present a badge. The LED on a lock will begin flashing to indicate the linking process is occurring.
4. After the address and link are established, you may proceed to configure the other properties using SUS.

111.8 Connect the HHD to the Lock

1. Connect the USB cable to the HHD and then plug the HHD USB cable into the lock’s USB port located in the bottom of the exterior housing.

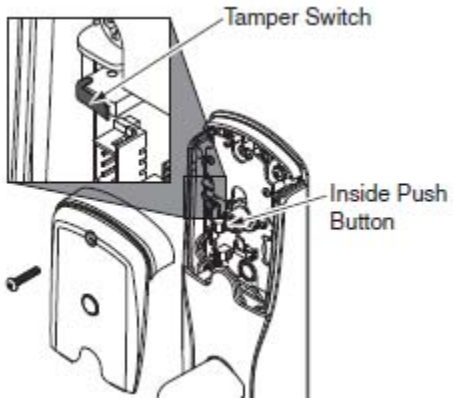
2. Press the Schlage button twice. The Schlage button will flash green while the lock is waiting to communicate with the HHD. The Schlage button will begin to flash red when communication between the lock the HHD is established. When communication is established, the device name will be displayed on the SUS main screen.

111.9 Use the HHD to Couple to the Lock

AD-400 locks can be coupled, or authenticated, using the HHD. This provides enhanced security by ensuring that the lock will only communicate with HHD to which it has been coupled.

1. Connect the HHD to the lock using the HH-USB cable.
2. Press the Schlage button twice. The lock will be displayed on the screen.

3. On the HHD, select **Device Options**.
4. Remove the top inside lock cover.
5. Press and hold the Inside Push button. Then press and release the tamper switch three times.



6. Release the Inside Push button. On the lock, the Inside Push button LED will illuminate.
7. On the HHD, select **Couple HHD to Device**. When coupling is successful, a message will be displayed on the screen.

112 Wiring and Setup

For installation and operating instructions, refer to the PIM400 and PIM401 User Guide at www.schlage.com/support before connecting the PIM400-485 to an access control panel.

Important: Disconnect the access control panel power and batteries while wiring the PIM400 to the panel.

Notes: The EIA RS-485 specification labels the data wires as “A” and “B” however. many RS-485 products label their wires “+” and “-” while some products associate the “+” signal with “A” and some with “B.” Reversing polarity will not damage either RS-485 device, but it will not be able to communicate. If communication is not successful, then switch the connections.

The wires from the access control panel must be a shielded twisted pair. For maximum wire lengths and cable specifications, refer to Cable/Wire Specifications in the PIM400 and PIM401 User Guide.

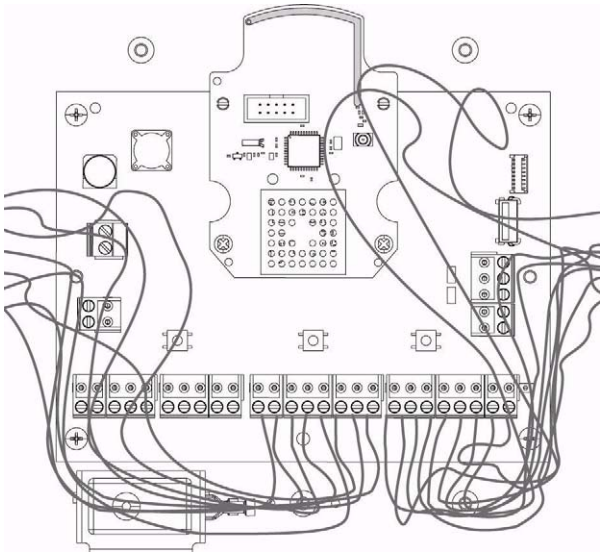
You must use a UL 294 listed power supply capable of sourcing at least 250mA @ 12 or 24 VDC.

Access Control Panel Connection

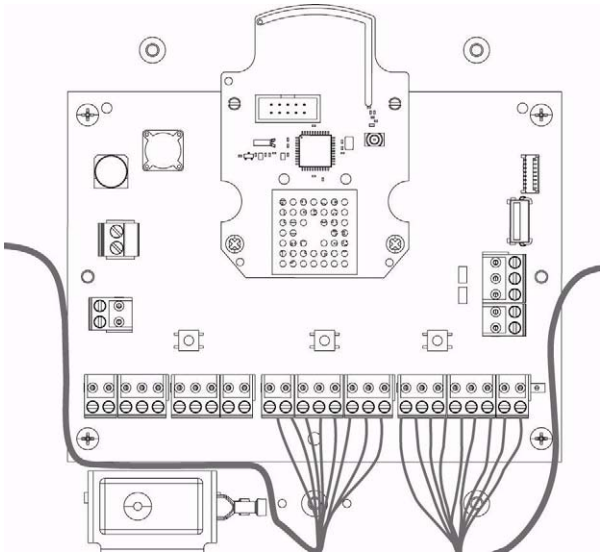
Connector		Signal	Access Panel Signal	Description
J2		J2 (1)	+ 12 or 24 VDC	PIM400 inputs for 12 or 24 VDC power. Draws 250mA maximum. If the access control panel reader power outputs do not source enough current for the PIM400-485, use the access control panel main regulated 12 VDC power supply or a separate UL 294 Listed 12 or 24 VDC power supply. Power input is non-polarized.
		J2 (2)	DC Ground	
J5	J5 (1)	RA-	- Receive data	4-wire or 2-wire bi-directional RS-485 communications port for interface to access control panels. 2-wire installation: shorting jumpers J19 and J20 should be added. 4 -wire installation: shorting jumpers J19 and J20 should be removed.
	J5 (2)	TA-	- Transmit data	
	J5 (3)	RB+	+ Receive data	
	J5 (4)	TB+	+ Transmit data	
	J5 (5)	GRD	Signal Ground	

Important: Do not run signal or power wiring through the top of the PIM400 enclosure.

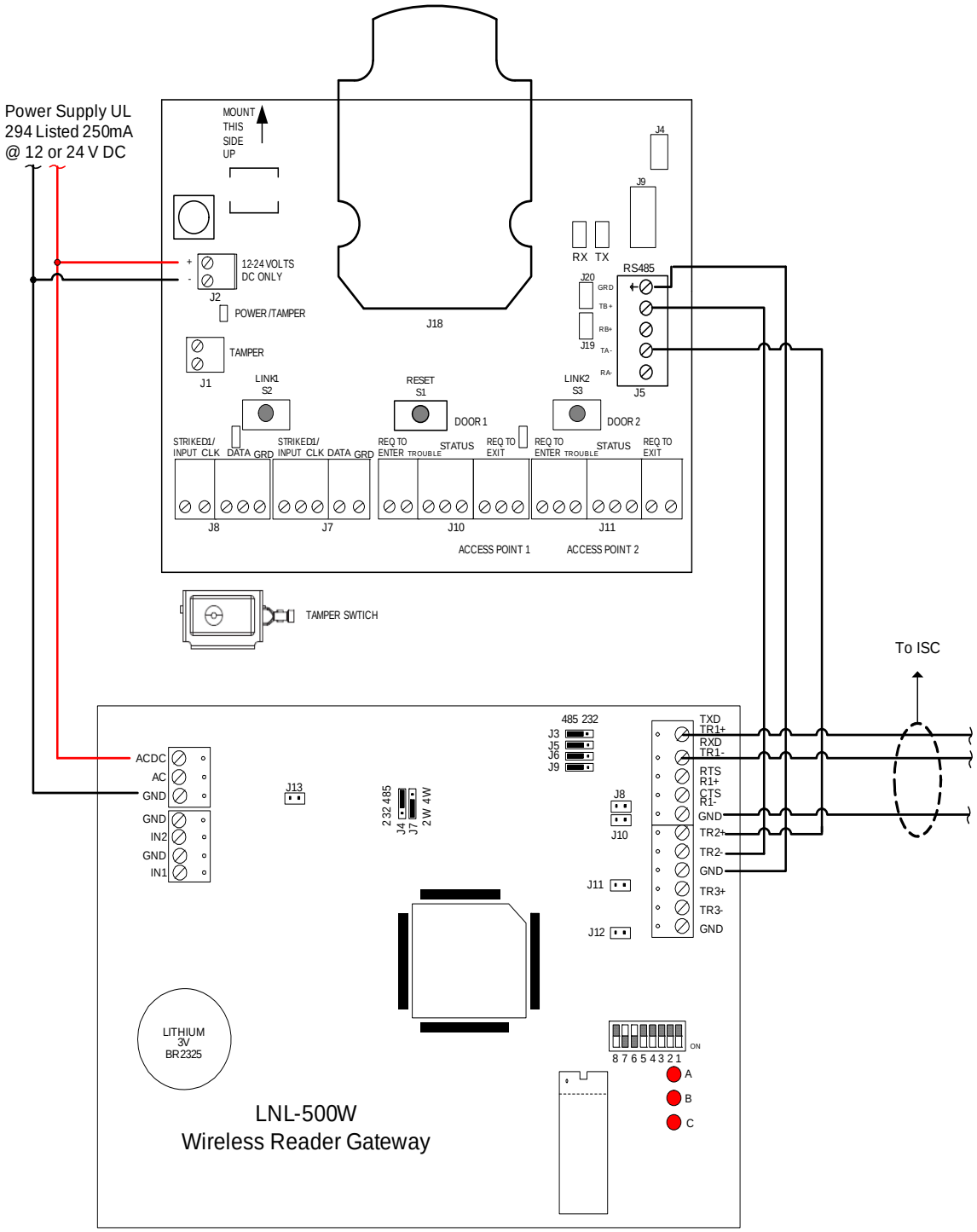
PIM400 incorrect wiring



PIM400 correct wiring



Wiring the LNL-500W and PIM400-485



113 Locks

Schlage AD-400 wireless access locks are designed to eliminate the wiring from doors to panels. This minimizes the wiring required at or around the door. OnGuard supports a number of integrated locks and readers. Once the PIM400-485 is connected, the Schlage wireless locks may be used. For more information, refer to the Schlage Wireless Access System documentation.

113.1 OnGuard Configuration

The Schlage wireless locks are configured similar to readers in System Administration. Since these locks are configured on a gateway, specify a reader number for each lock that corresponds to its address on the gateway. The lock at address 0 (reader number 0) must be the first lock configured.

Make sure to select the proper reader type for your configuration: either “Schlage Wireless Access (Mag w/ Wiegand output)” or “Schlage Wireless Access (Wiegand/Prox).”

113.1.1 Strike Time

The strike times cannot be configured from OnGuard; these would need to be configured using the Schlage Wireless software (SUS) if you wish to have values other than the default values. However, the strike time in OnGuard MUST be configured to match the setting in the CDT. The valid range for the strike time for Schlage Wireless is from 1 to 255 seconds with a default of 3 seconds.

113.1.2 Reported Trouble Alarms

These alarms are specific to Schlage wireless locks:

- **Loss of communications.** A break in RF communications can be detected within minutes, even seconds sometimes.

- **Low power (battery life).** When low power has been indicated, the lock can continue to function for another 5000 to 10,000 swipes.

- **Tamper at the doors.** This means that the lock has been removed.

- **Stalled motor.** The lock motor has stopped running.

113.1.3 Standard Lock Status Indications

- Lock/Unlock status (Clutch Position)
- Request-to-Exit Switch
- Door Position Switch
- Mechanical Key Override (Only available when linked via the PIM400-485.)
- Deadbolt Position (Only available when linked via the PIM400-485.)
- Interior Cover Tamper Guard
- Battery Status
- Communication Status

- Request-to-Enter

114 Specifications

The LNL-500W is for use in low voltage, class 2 circuits only.

- Primary Power: (DC or AC)
  - DC input: 12 VDC ± 10%. 250 mA
  - AC input: 12 VAC ± 15%. 400 mA RMS
- Memory and Clock Backup: 3 V lithium (does not apply to this hardware)
- Communication Ports:
  - Port 1: RS-232 or RS-485, 2400 to 38400 bps async
  - Ports 2-3: RS-485 (2-wire), 2400 to 38400 bps async
- Inputs:
  - Cabinet Tamper Monitor: unsupervised, dedicated
  - Power Fault Monitor: unsupervised, dedicated
- Wire Requirements:
  - Power: 1 twisted pair, 18 AWG
  - RS-485: 24 AWG twisted pair(s) with shield, 4000 feet (1219 m) maximum
  - RS-232: 24 AWG, 25 feet (7.6 m) maximum
  - Alarm Input: twisted pair, 30 ohms maximum
- Environmental:
  - Temperature: Operating: 0° to 70° C (32° to 158° F)
    Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimension: 6 x 5 x 1 in. (152 x 127 x 25 mm)
  - Weight: 8 oz. (290 g) nominal
- Data Memory: 512 KB
- Certifications:
  - UL294 Listed
  - CE marking
  - RoHS compliant

Note: These specifications are subject to change without notice.

PIM400-485

- Frequency range: 902 - 928 MHz
- Modulation: 900 MHz spread spectrum, direct sequence, 10 channels
- RF Interference Avoidance Optional Dynamic Channel Switching
- Transmission/Encryption: AES-128 bit Key (optional)
- Credential verification time: < 1 second (dependant on latency time of access control panel)
- Communication range:
  - Up to 200 feet [61 m] with obstructions
  - Up to 1000 feet [305 m] clear line of site
  - Up to 2000 feet [609 m] line of site with high gain antenna on PIM400
  - Up to 4000 feet [1219 m] line of site with high gain antennas on PIM400 and WRI400

- Power supply: 12 VDC or 24 VDC
- Voltage range: 9.5 VDC to 26 VDC
- Maximum current requirement: Up to 250 mA
- Operating temperature: -31° to 151°F (-35° to 66°C)
- Operating humidity: 0 - 100% condensing
- Dimensions: 7.1” x 7.1” x 3.0” [18.0cm x 18.0cm x 7.6cm]
- Weight: 1.25 lbs [56 kg]
- Wire requirements:
  - DC Power Input: 18AWG, 2 Conductor (Belden8760 or equivalent) up to 1000 feet [305 m]
  - PIM400-485 to reader interface module: 24AWG, 2 or 4 Conductor Shielded (Belden 9842, 9841 or equivalent) up to 4000 feet [1219 m]
- Data Rate RF: 40 kbps; RS-485: 9.6 kbps
- Certifications
  - NEMA 1, 4, 4X, 6
  - UL 294
  - FCC Part 15
  - Canada RSS 210
  - RoHS

COMMAND KEYPAD

115 Command Keypad Overview

The LNL-CK command keypad integrates a 32-character back-lit LCD display with a 16-position keypad and a reader port. It serves as a command reader, with programming being accomplished using OnGuard. This device features time display (in either 12-hour or 24-hour clock format, based on the Windows setting of the Communications Server) and text feedback during reader operations. For example, when using the extended held open command, the command keypad displays the time countdown before the held open time is reached. It also displays status, such as access granted, access denied, enter PIN, etc. Features supported include:

- Card/PIN access
- Function execution
- Extended held open time
- Global arm and disarm

With build 5.12.1XX, the following features will be supported:

- Instant commands
- Advanced arm and disarm

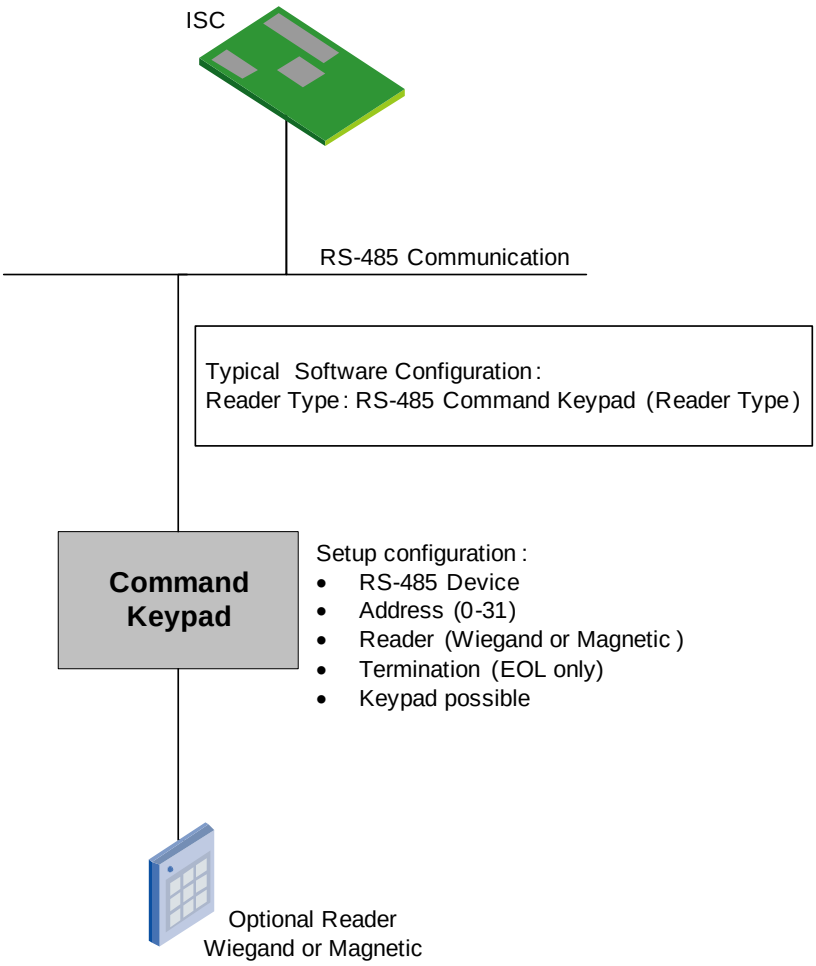
Features enabled in OnGuard 5.12.1XX are NOT backwards-compatible.

115.1 Communication

The command keypad communicates with the controller via a 2-wire RS-485 interface or as a reader device through a reader interface module. There are three possible scenarios:

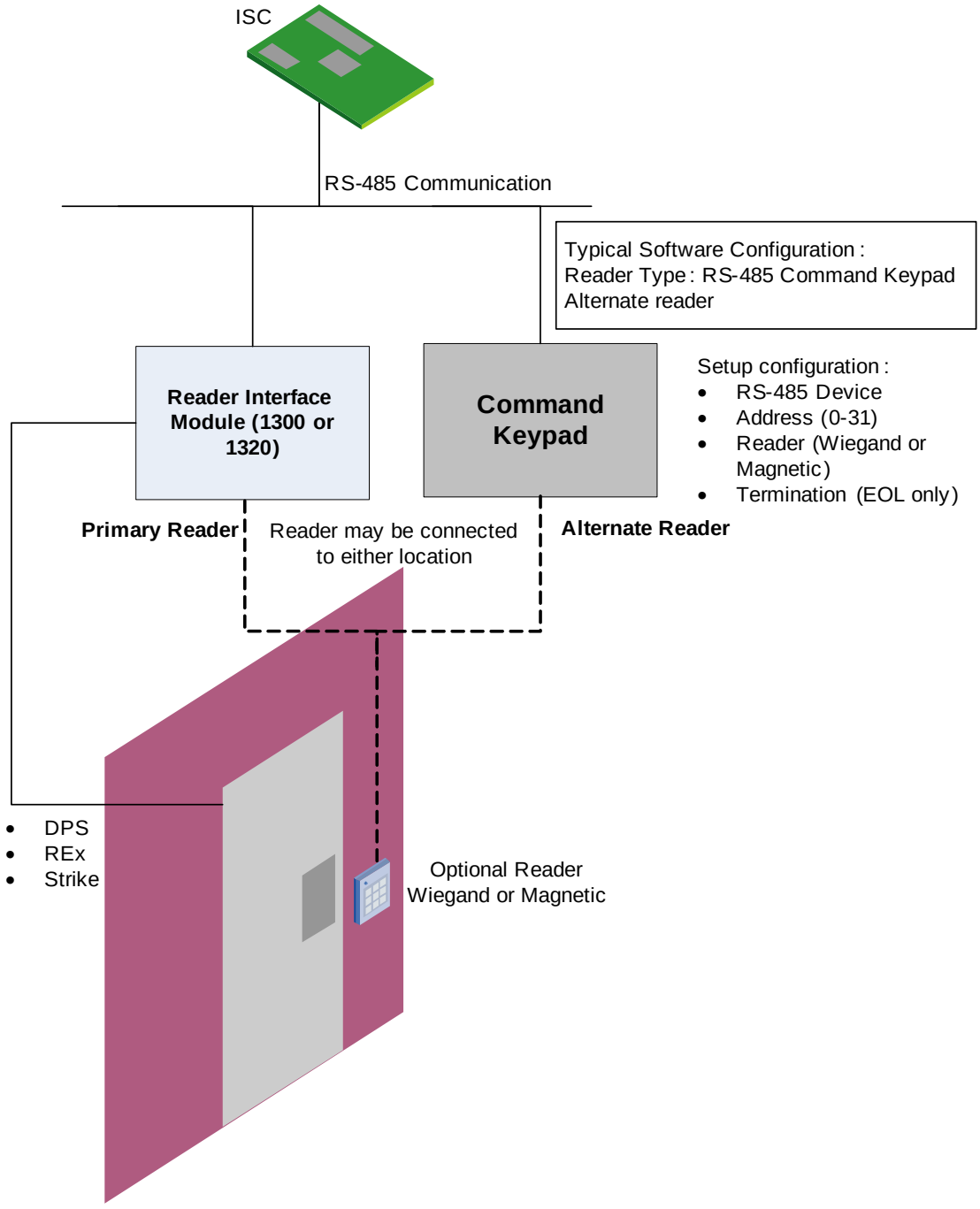
1. The LNL-CK can be installed as a stand-alone device. It can be connected via RS-485 and may be used to execute command programming (*4-15#) or the extended held open command. With the optional reader connected, all reader modes are supported. The keypad supports PIN entry; however, there is no door hardware connection capability.

Command Keypad installed as stand-alone device



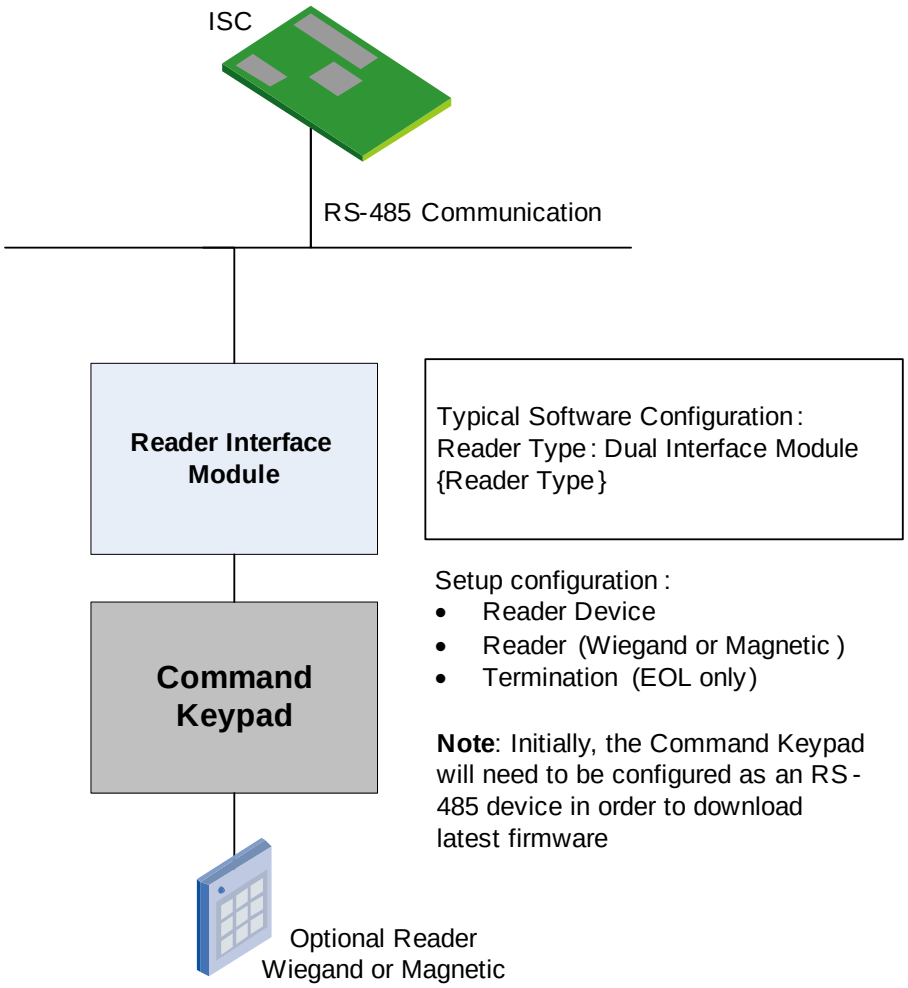
2. The LNL-CK can be connected via RS-485 and used as an alternate reader device along with a primary reader (associated with a single/dual reader interface module) for door inputs and outputs from the primary reader interface device. In this scenario, it will support all reader modes. It may be used to execute command programming (Card Reader Cipher Mode, Extended Held Open Time, User Command Programming ability) as well as PIN entry.

Command Keypad installed as alternate reader device



3. The LNL-CK can be connected as a primary reader device on the reader interface module along with any type of alternate reader (for example, a biometric device). The LNL-CK will support all reader modes. It may be used for PIN entry or execution of command programming. The reader interface allows door hardware connection capability.

Command Keypad installed as reader device


ISC
RS-485 Communication
Reader Interface Module
Typical Software Configuration:
Reader Type: Dual Interface Module
{Reader Type}
Setup configuration:
• Reader Device
• Reader (Wiegand or Magnetic)
• Termination (EOL only)
Command Keypad
Note: Initially, the Command Keypad will need to be configured as an RS-485 device in order to download latest firmware
Optional Reader
Wiegand or Magnetic

The keypad communicates to a controller via a half duplex multi-drop 2-wire RS-485 interface. The total cable length is limited to 4000 feet [1219 m]. It can also communicate via Wiegand interface, with a maximum cable length of 500 feet [152.4 m]. Shielded cable of 24 AWG with characteristic impedance of 120 ohm is specified for the RS-485 interface. If the LNL-CK is the last device on each end of the cable, it should have the termination enabled (set DIP1=ON).

115.1.1 Hardware Revision and Firmware

The hardware revision can be determined in one of two ways:

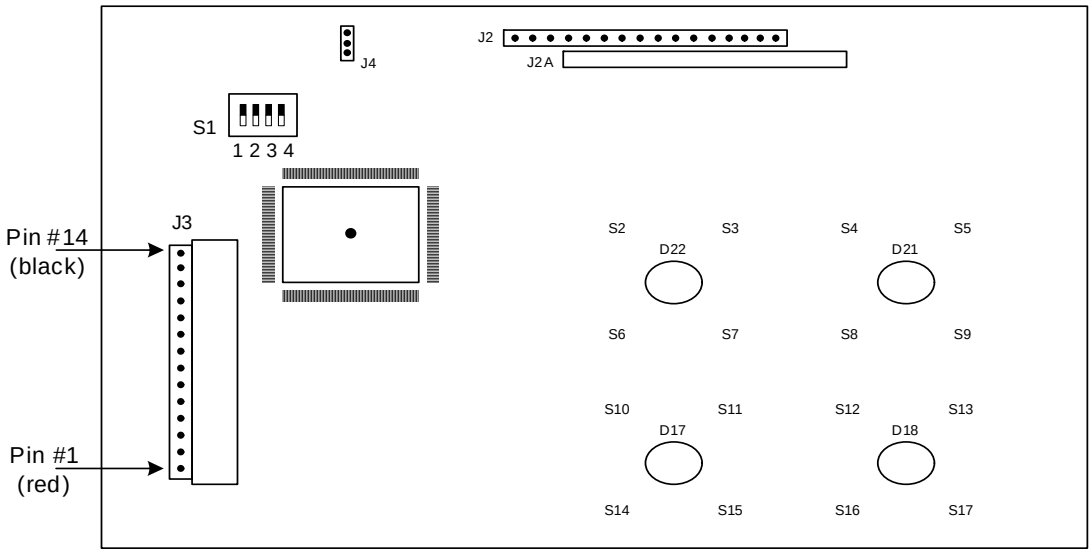
- Check the circuit board revision label located on the backside of the board.
- Simultaneously press the center two keys of the top row on the keypad. The last character on the right of the top line is the hardware revision.

In order for the command keypad to function properly, the following firmware is required:

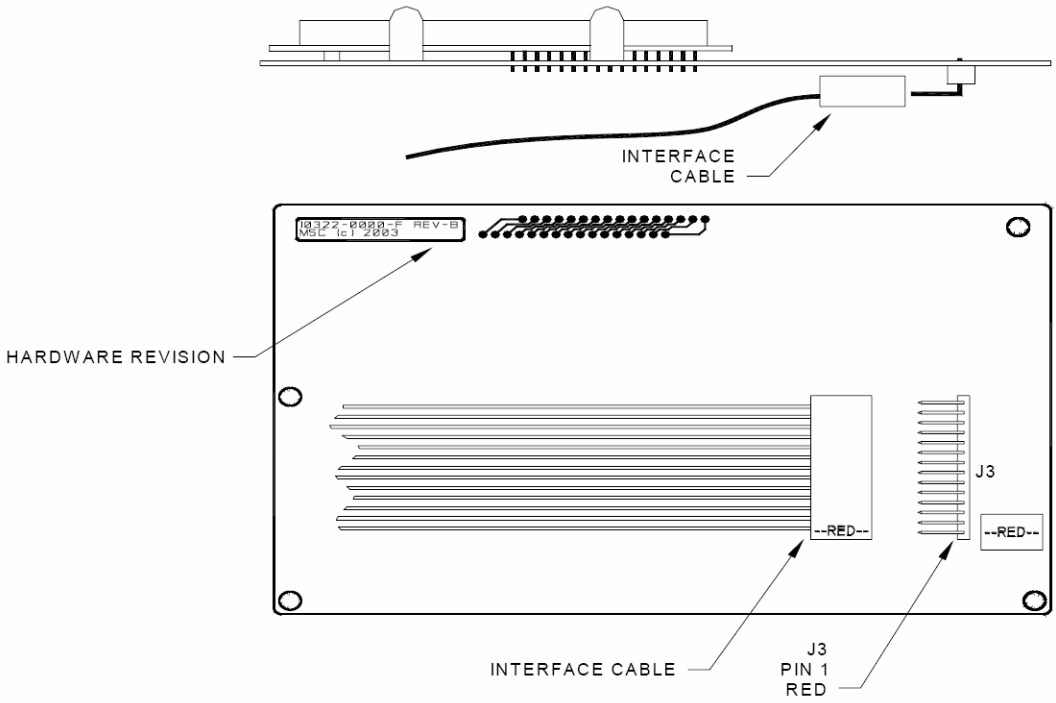
- LNL-CK rev. A uses firmware 1.2x through 1.3x.
- LNL-CK rev. B uses firmware 1.4x or higher.
- Reader interface module (1.31 for the LNL-1300 or 1.27 for the LNL-1320) or intelligent dual reader controller (1.0)
- Controller (LNL-500, 1000, 2000) firmware 3.099 or higher (1.00 or higher for the LNL-2220 or 3300)

115.1.2 Wiring the LNL-CK

When plugging the connector into the pin block, line up the red wire with pin #1 and the black wire with pin #14 (as marked on the back of the board).



Side and rear view of the command keypad board



Use the following table to connect the wires properly.

Command Keypad Power

The LNL-CK requires 12 VDC ± 15% for power. The power source must be regulated and isolated. Wires connected to pins 1-2 are for power.

Pin	Color	Signal
1	Red	12 VDC IN
2	Black	DC Ground

Command Keypad Communication

(For the ISC RS-485 Connection)

Wires connected to pins 3-4 are used for units wired via 2-wire RS-485.

Pin	Color	Signal
3	Blue	RS-485 TR +
4	Gray	RS-485 TR -
14	Black	Signal Ground

(For the Series 1 Reader Interface Connection)

Wires connected to pins 5-8 are used for units connecting to the series 1 reader interface module.

Pin	Color	Signal
5	Green	DAT/D0 on the reader interface module
6	White	CLK/D1 on the reader interface module
7	Brown	LED on the reader interface module
8	Orange	BZR on the reader interface module
14	Black	Signal Ground

(For Series 2 Reader Interface and Intelligent Dual Reader Controller Connection)

If you are using the Intelligent Dual Reader Controller or Series 2 Dual Reader Interface Module, the wiring is different from the Series 1 board. Use the following chart.

Pin	Color	Signal
3	Blue	RS-485 TR+
4	Gray	RS-485 TR-
2	Black	Reader Ground
14	Black	Signal Ground

The Command Keypad should have the following settings, which is configured in the keypad configuration menu (see LNL-CK Configuration, on page 616 for details.)

- RS-485 mode
- 9600 baud
- Address 0

Wires connected to pins 9-14 are used for readers wired to this unit.

Pin	Color	Signal
9	Red	12 VDC pass through for reader (175 mA maximum)
10	Green	Reader Data (DATA 0)
11	White	Reader Clock (DATA 1)
12	Brown	Reader LED
13	Orange	Reader Buzzer
14	Black	Ground

When connecting this device via RS-485, there are no door inputs/outputs unless the following conditions are met:

- it is configured as an alternate reader and
- it is linked to a primary reader which is connected to a reader interface module.

115.1.3 DIP Switches

This command keypad has four DIP switches that must be configured.

DIP switch	Setting	Used to configure:
1	OFF	RS-485: no termination
	ON	RS-485: 120 Ohms termination
2	OFF	Use configuration settings (done using programmable keypad)
	ON	Force the use of 38400 baud rate and address 31
3	OFF	Allow software configuration at startup
	ON	Disable software configuration at startup.
4	OFF	not used

Proper termination is required for proper operation. If the LNL-CK is the first or last device on the RS-485 bus, DIP switch 1 should be ON.

Set DIP switch 3 to the ON position to disable the ability to use to keypad for changing the configuration during power-up. This decreases the possibility of unauthorized persons from altering the configuration.

115.1.4 Jumpers

Jumper J1, J5, and J6 are for factory use only. By default, this device is shipped with this jumper open and should not be changed.

Jumper J4 is for firmware flash upgrade. To allow flash upgrades on revision A boards, jumper pins 1-2. To disable this feature, jumper pins 2-3. If you have a revision B board, J4 is not present and no action is required to enable the programming of flash memory.

115.1.5 LNL-CK Configuration

Configuration of the LNL-CK is usually performed at the keypad during the startup process. When power is applied, the screen will flash a message: “Press two keys for Setup.” If the two keys indicated are pressed simultaneously, the setup screen will appear. Follow the instructions on the LCD. Selections include:

- **Communication** Choose RS-485 or reader port. If reader port is chosen, the baud rate and communication address settings will be skipped.

- **Baud rate** This selection should match with the baud rate of the controller (typically 38400 bps).

- **Communication Address** The communication address should be set to a unique value. The valid range is 0-31.

- **Backlight** This setting defines the behavior of the display backlight. 00=always off, 99=always on, 01-98=number of seconds the backlight remains on after no activity.

• **LED** This setting selects the LED drive type to match the reader connected to the reader port. 1-Wire: standard 1-wire interface (High=RED, Low=GREEN). 2-Wire: BRN wire controls red LED (High=Off, Low=On), ORG wire controls green LED (High=Off, Low=On), No Buzzer. 2-Wire/Special: corresponds to Dorado LED control.

115.1.6 Status Display

The command keypad can display a status report so that you can confirm settings, check the serial number, firmware revision number, or hardware settings. It also displays a communication status (on-line or off-line). To view the status display, simultaneously press the two center keys of the top row on the keypad:

(top line)
`AAAAAAAAAA-BBBBB`
(lower line)
`CCCCCCCCSW-X234 D`

- A represents the unit's ten-digit serial number
- B represents the firmware revision level. The right-most character represents the PCB revision level.
- C represents the current operating mode.
  - Reader port mode = rdr port
  - RS-485 mode = baud rate-address
- SW-X234 represents the current S1 DIP switch setting. X
- D represents the communication status (On-line = o).

115.1.7 OnGuard Configuration

When connecting the command keypad using RS-485, OnGuard allows for three possible choices to select for the reader type:

- RS-485 Command Keypad (LNL-1300T).
  The LNL-1300T is no longer available for sale. This selection is available in the software for legacy support.
- RS-485 Command Keypad (All Other Readers)
- RS-485 Command Keypad (Wiegand/Prox)
- RS-485 Command Keypad (Mag w/ Wiegand Output)

Use this field to configure the card reader that is wired into the command keypad. The LED mode for this type of reader will automatically be configured as LCD Command Keypad by the system and cannot be modified. This LED mode setting indicates that the attached reader is capable of LED/text. This is configured when attaching the LNL-CK to a reader interface module. Choosing "LCD Command Keypad" tells the system that it is the LNL-CK being connected to the reader interface module. The reader type in this case is the normal "Dual reader 1..." or "Dual reader 2..." reader type that is typically selected for the reader interface module, depending on if the reader is connected to the reader 1 port or the reader 2 port. The type of card reader connected into the LNL-CK determines which type is selected.

When connecting the command keypad using the dual reader interface module (Dual Interface Rdr 1/Dual Interface Rdr 2), the reader type must also be selected according to the card reader wired to the command keypad (All Other Readers, Wiegand/Prox, or Mag w/ Wiegand Output). Select LCD Command Keypad for the LED mode to identify the device connected to the reader interface module as an LCD-capable device, and not a typical card reader.

All door inputs (aux inputs, REx, door contact) and door outputs (aux outputs, strike) are controlled by reader interface module.

Text Display Options

The text displayed on the command keypad is configurable through the access control software. The display may include the time, status of default area, or any user definable text strings. It is limited to 8 strings, a maximum of 16 characters each.

Multi-level Command Authority

Commands may be enabled globally, or at a more advanced level. The authority levels may be configured as No authority, Level 1, or Level 2. These levels apply to the commands to view, disarm, arm, and force arm.

Macros

Macros may be used to define a key sequence. It is limited to the characters found on the keypad (0-9, *, #) and the function keys. Macros may be defined using the following combinations of function keys:

- Individual keys: F1, F2, F3, F4
- F1 + F2
- F3 + F4
- F1 + F4
- The F2 + F3 combination is used to determine the hardware revision.

Note: For detailed information, refer to the System Administration User Guide.

115.1.8 Command Programming

The command keypad allows PIN entry on standard keypad readers. If your PIN is shorter then the maximum length, press [#] after entering the PIN number.

Note: The typical [*] key on the keypad is labeled with an arrow and the [#] key is labeled with [COMMAND].

Commands are programmed in System Administration. The standard command string is [*], followed by a number (4-15), followed by [#]. Commands are executed according to the configuration of Local I/O function list(s).

115.1.9 Command Keypad Behavior

The LNL-CK supports two formats for time display: a 12-hour clock or 24-hour clock display. This is configured based on the Windows regional settings of the machine running the Communication Server.

- When the device is in Locked mode, “Locked” is displayed on line 1. The current time is displayed on line 2. This is an IDLE mode.

- When the device is in Unlocked mode, “Unlocked” is displayed on line 1. The current time is displayed on line 2. This is an IDLE mode.
- When the device in any mode other than locked or unlocked and waiting for input, “Ready” is displayed on line 1. The current time is displayed on line 2. This is also an IDLE mode.
- When an access or other attempt is denied, “Denied” is displayed on line 1. The current time is displayed on line 2. This text is displayed for 3 seconds. It is displayed in the following scenarios:
  - Access Denied on card/PIN access attempt
  - Timeout of second card request
  - Timeout while waiting for biometric verification
  - The [#] key is pressed while waiting for a pin, but no keys have been entered
  - Timeout during PIN or user command entry
- When access is granted, “Access Granted” is displayed on line 1. The current time is displayed on line 2.
- When there is a valid card swipe at a reader in card and PIN mode, “Enter PIN” is displayed on line 1. “?” is displayed on line 2. As keys are entered, a “*” is shown for each keystroke.
- When a valid PIN is entered at a reader in card and PIN mode, “Enter Badge” is displayed on line 1. This state only exists when using controller firmware 3.050 or higher. In previous versions, no prompt is displayed here after entering the PIN.
- Whenever additional credentials are needed, “Next Badge” is displayed on line 1. The current time is displayed on line 2. Additional credentials can be required due to two-card control and APB occupancy issues (such two-man area control).
- When an access attempt is awaiting host based decision (global APB), “…” is displayed on line 1. This state only exists when using controller firmware 3.050 or higher. In previous versions, “Enter Badge” would be displayed here.
- When there is an access attempt awaiting biometric data, “Enter Biometric” is displayed on line 1 in version 5.10.419. Or, if you are using a previous version of OnGuard, “Biometric Test” is displayed instead. This state only exists when using controller firmware 3.050 or higher.
- When an extended held open command is denied due to invalid credentials or if it is not supported at the given reader, “Not Authorized” is displayed on line 1. The current time is displayed on line 2.
- When an extended held command is denied due to arguments entered out of range, “Invalid Data” is displayed on line 1. The current time is displayed on line 2.
- When the reader has entered extended held open mode, “Timed Door Open:” is displayed on line 1. The remaining number of minutes and seconds to alarm is displayed on line 2.
- Whenever a command has been entered and accepted for processing, “Command Accepted” will be displayed on line 1 and the current time on line 2. This simply means that a key stream has been sent to the controller for processing as a potential command sequence. It is simply verification that the entered data has been seen by the system and is NOT an indication of a command being executed.

Alarm Mask Groups

The control of alarm mask groups is accessible through command keypad devices. The command will allow a user to arm/disarm an alarm mask group from the keypad with visual feedback on the LCD.

Note: For arming/disarming alarm mask groups, the LNL-CK must have firmware version 3.081 or higher.

To issue the command, you must receive a valid access grant at the reader and also have arm/disarm command authority. To use the feature:

1. Press [*] (on the command keypad, this is equivalent to the arrow key).
2. Enter the command sequence as programmed (defined in System Administration), followed by a two-digit alarm mask group ID.
3. To finalize the command press [#] (on the command keypad, this is represented with the [COMMAND] key.
4. Follow the prompts displayed on the LCD. They will be different, depending on if the alarm mask group was already armed or disarmed.

If it is armed...	**If it is disarmed...**

If you would like to disarm the alarm mask group, press [1]. The LCD will then display:
`*** DISARMED ***`
	The system will check to see if any points are active.
	• If no points are active, the LCD will display:
	`ALL SECURE`
	`<2> TO ARM`
	- If you would like to arm, press [2]. The LCD will display:
	`ARMING, EXIT NOW`
	- Otherwise, do not press anything (or if you press key other than [2]), it will remain disarmed.
	• If points are active, the LCD will display:
	nn `ZONES FAULTED`
	`<4> TO VIEW`
	(where *nn* is the number of points active).
	Press [4] to scroll through and view active points.
	After it is done, the LCD will display:
	nn `ZONES FAULTED`
	`<3> TO FORCE-ARM`
	- Press [3] to force-arm the alarm mask group. The LCD will display:
	`ARMING, EXIT NOW`
	- Do nothing (or if you press any key other than [3]) to leave it disarmed.

Advanced permission control allows the following commands to be enabled or disabled on a per-keypad basis:

- Default Alarm Mask Group Intrusion Commands
  - No mask group ID needs to be specified
  - Arm the default area.
  - Force-arm the default area (auto-bypass).
  - Disarm the default area.
  - View faulted zones in the default area.
- Any Alarm Mask Group Intrusion Commands
  - Mask group ID from 00 to 99 must be appended to the command.
  - Arm the specified area.
  - Force-arm the specified area (auto-bypass)
  - Disarm the specified area.
  - View faulted zones in the specified area.

- Features such as auto-bypass for forced arm should not be programmed for UL.

115.2 Specifications

** The command keypad is for use in low voltage, class 2 circuits only.

- Primary Power: (DC)
  - DC input: 12 VDC ± 15%. 175 mA
- Reader Ports:
  - Power: pass through
  - Interface: 2-wire, clock/data or data 1/data 0
  - LED control: 2-wire or 1-wire bi-color
  - Buzzer control: available only in 1-wire LED control mode
- Communication:
  - RS-485: 24 AWG, 4000 feet (1200 m) maximum, 120 ohms impedance
  - TTL: 18 AWG, 500 feet (152.4 m) maximum
- Environmental:
  - Temperature: 0º to 50° C operating, -20º to +70° C, storage
  - Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimension: 6.75 x 5 x 1 in. (172 x 127 x 25 mm)
  - Weight: 14 oz. (400 g) nominal
- UL294 Listed

These specifications are subject to change without notice.

Index

A

AC inductive loads 42
AC power 19
Alarm input wiring 37
Alarm inputs 20
  intelligent dual reader controller (2220) 119, 141
  intelligent system controller (3300) 156
Alarms
  supervised 20
  unsupervised 20
AuthenTec fingerloc sensor 502
Axalto
  Reflex 72 502
  Reflex smart card readers 502
  Reflex usb 502

B

Battery
  intelligent system controller (1000) 89
  intelligent system controller (2000) 109
  intelligent system controller (500) 70
Baud rate
  biometric reader interface gateway 471
  downstream
    biometric reader interface gateway 472
    wireless reader gateway 572, 590
  dual reader interface module 346
  input control module 228, 237
  intelligent system controller (1000) 85
  intelligent system controller (2000) 103
  intelligent system controller (500) 68
  output control module 263
  single reader interface module 303
  wireless reader gateway 571, 589
Belden wires 21
Biocentric solutions
  enrollment 502
  interfaces 501
  maintenance 511
  readers 501
  specifications 514
  verification 505
Biometric reader interface gateway
  baud rate 471
  board components 464
  configuration 470
  DIP switches 470
  downstream baud rate 472
  downstream device communication 467
  installation 465
  interface address 470
  interfaces 463
  jumpers 472
  maintenance 473
  memory backup battery 473
  overview 463
  power 467
  specifications 475
  supported readers 474
  unsupervised alarm inputs 465
  upstream host communication 465
  verification 473
  wiring 465
Bioscrypt
  access readers 534
  card format configuration 546
  enrollment readers 523
  firmware 524
  installation 523
  overview 519
  power requirements 523
  verification 534
  V-Pass FX 531
  V-Pass FX readers 525
  V-Pass FX,V-Station A 519
  V-Smart reader operation 546
  V-Smart,V-Station 521
  V-Station A 531
  V-Station readers 529, 547
Black box
  2-wire rs-485 200
  4-wire rs-485 202
  rs-232 to rs-485 converters 200
  wiring 200, 202

C

Cabinet tamper 303
  single door controller module (1300-U) 325
Cable termination 23
CoBox
  dr 184
  micro 100 173
  token ring serial server 179
CombiSmart
  configuration 506
  enrollment 502
  maintenance 511
  reader operation 507

specifications 514
wiring 505
Command keypad
behavior 618
communication 609
configuration 616
DIP switches 616
firmware 613
jumpers 616
overview 609
specifications 621
status display 617
wiring 613
Command programming 618
Communication handshake status
intelligent system controller (1000) 85
intelligent system controller (500) 68
Communication password status
intelligent system controller (1000) 85
intelligent system controller (2000) 104
intelligent system controller (500) 68
Comtrol rocketport hub 210
Configuration
biometric reader interface gateway 470
dual door controller module (1320-U) 353
dual reader interface module 344
input control module 227, 238
intelligent dual reader controller (2220) 120, 121, 142, 144
intelligent system controller (1000) 84
intelligent system controller (2000) 102
intelligent system controller (3300) .. 156, 159
intelligent system controller (500) 67
magnetic card access reader 390, 403
output control module 262
output control module (1200-U) 273
single reader interface module 301
star multiplexer 381
wireless reader gateway 570, 588
Control output wiring 338, 365
Courier 3com u.s. robotics 56k modem 206
Current overload 24

D

DB25 serial cable 193
DC inductive load 42
DC negative 36
DC power 19
Device address
dual door controller module (1320-U) 354
dual reader interface module 344
input control module 227, 238
output control module 262
output control module (1200-U) 274
single door controller module (1300-U) 312
single reader interface module 302
Device configuration checks 43
Device placement 24
Device to device connection 23
Dial-up configuration 203
DIP switches
biometric reader interface gateway 470
command keypad 616
dual door controller module (1320-U) 353
dual reader interface module 344
input control module 227
intelligent system controller (1000) 84
intelligent system controller (2000) 102
intelligent system controller (3300) 156
intelligent system controller (500) 67
magnetic card access reader 390, 404
output control module 262
star multiplexer 381
wireless reader gateway 570, 588
Downstream
dual door controller module (1320-U) 366
intelligent system controller (1000) 81
intelligent system controller (2000) 99
intelligent system controller (500) 64
single door controller module (1300-U) 322
single reader interface module 297
star multiplexer 378
DSTni-xpress DR 184
Dual Door Controller Module (1320-U)
unsupervised alarm inputs 368
Dual door controller module (1320-U)
configuration 353
device address 354
DIP switches 353
downstream reader communication 366
installation 352
jumpers 356
LEDs 357
outputs 365
overview 351
power 368
specifications 370
supervised alarm inputs 364
upstream controller communication 364
wiring 363
Dual reader interface module
board components 332
configuration 344
device address 344
DIP switches 344
downstream reader communication 339
elevator control 342

installation 335
jumpers 347
outputs 338
overview 331
power 341
specifications 348
supervised alarm inputs 335
upstream controller communication 337
wiring 335

E

Elevator control
dual reader interface module 342
input control module 226
output control module 260
output control module (1200-U) 284
single door controller module (1300-U) 324
single reader interface module 299
Enrollment
combismart 502
configuration 504
fingerprint 502, 504
guarddog 502
ETHLAN (MSS1/MSS100 ethernet controller) 168
ETHLAN-MICR (micro serial server) 171
ETHLAN-MICR standoffs 172

F

Field hardware power supplies 28
FingerLoc 502
Fingerprinting
accurate enrollment and fast verification 511
finger selection and placement 512
tips and tricks 511
Firmware updates 45

G

Ground
lenelprox 416
magnetic card access reader 391, 406
Ground potential difference checks 44
Ground wiring 36
Grounding system 36
GuardDog
enrollment 502
reader operation 510
specifications 515
wiring 509

H

HandKey
configuration 488
DIP switches 490, 492
enrollment 481, 483
reader enrollment 480
reader operation 492
reset 490
verification 491
wiring 490
wiring for verification 486
Hardware installation guidelines 17

I

IC108A/IC109A rs-232 to rs-485 converter
2-wire 199
4-wire 198
Input control module
baud rate 228, 237
board components 220
configuration 227, 238
device address 227, 238
DIP switches 227
elevator control 226
installation 222
interfaces 219
jumpers 230
LEDs 220, 257
overview 219
power 225
relay outputs 224
software configurable alarm inputs 222
specifications 232
unsupervised alarm inputs 222
upstream controller communication 223
wiring 222
Input control module (1100-U)
DIP switches 237
input wiring 244
installation 236
jumpers 239
mounting 242
overview 235
power 249
relay outputs 248
software configurable alarm inputs 246
specifications 251
status LEDs 240
supervised alarm inputs 244
unsupervised alarm inputs 245
upstream controller communication 246
wiring digital inputs 244
Inputs 19
Intelligent dual reader controller (2220)
alarm inputsinputs 119, 141
board components 132

configuration 120, 121, 142, 144
installation 115, 134
interfaces 131
jumpers 120, 143
maintenance 126, 147
overview 131
power 119, 141
reader wiring 116, 137
specifications 127, 149
web page 121, 144
wiring 116, 136
Intelligent paired reader controller (2210)
overview 113
Intelligent system controller (1000)
baud rate 85
board components 76
configuration 84
DIP switches 84
downstream device communication 81
handshake status 85
installation 77
interfaces 75
jumpers 86
maintenance 89
memory expansion 87
overview 75
password status 85
power 83
processor address 84
specifications 90
status,verification 89
termination 88
unsupervised alarm inputs 77
upstream host communication 77
wiring 77
Intelligent system controller (2000)
baud rate 103
board components 94
configuration 102
DIP switches 102
downstream device communication 99
hardware flow control 103
installation 95
interfaces 93
jumpers 105
maintenance 109
memory expansion 106
overview 93
password status 104
power 101
processor address 102
RAM chip 106
specifications 110
status,verification 109
termination 107
unsupervised alarm inputs 95
upstream host communication 95
wiring 95
Intelligent system controller (3300)
alarm inputs 156
board components 153
configuration 156
configuration,web page 159
DIP switches 156
installation 155
interfaces 153
jumpers 157
maintenance 162
overview 153
power 156
specifications 164
wiring 155
Intelligent system controller (500)
baud rate 68
board components 59
configuration 67
DIP switches 67
downstream device communication 64
handshake status 68
installation 61
interfaces 59
jumpers 69
maintenance 70
memory backup battery 70
overview 59
password status 68
power 66
processor address 67
specifications 71
status,verification 70
unsupervised alarm inputs 61
upstream host communication 61
wiring 61
Interface address
biometric reader interface gateway 470
wireless reader gateway 570, 588
Interface signals 19
Interfaces
biocentric solutions 501
biometric reader interface gateway 463
wireless reader gateway 565, 583
ISC communication 167

J

Jumpers
biometric reader interface gateway 472
command keypad 616

dual reader interface module 347
input control module..... 230
intelligent dual reader controller (2220) 120, 143
intelligent system controller (1000)..... 86
intelligent system controller (2000)..... 105
intelligent system controller (3300)..... 157
intelligent system controller (500)..... 69
magnetic card access reader..... 390, 404
output control module..... 265
single door controller module (1300-U).... 317
single reader interface module..... 301
star multiplexer..... 382
wireless reader gateway..... 572, 590

K

Keypad data 405
Keypads 447, 449

L

LAN connections 167
Lantronix
cobox token ring serial server..... 179
cobox-dr..... 184
devices 167
securebox sds1100..... 185
uds-10 190
LEDs
dual door controller module (1320-U)..... 357
dual reader interface module 333
magnetic card access reader..... 391
magnetic card access readers..... 406
output control module..... 257
output control module (1200-U)..... 276
single door controller module (1300-U).... 314
single reader interface module..... 292
star multiplexer..... 376
Lenel keypads 449
Lenel opencard readers..... 455
XF100D,XF2100D,XF2110D 455
LenelProx
BT-LPKP-NDK..... 422
BT-LPKP-NDK installation 422
BT-LPKP-NDK operating modes..... 425
BT-LPKP-NDK specifications..... 425
grounding..... 416
installation guidelines..... 415
installation kit 445
LPKP-6800 417
LPKP-6800 installation 417
LPKP-6800 specifications 419
LPKP-6840 422
LPKP-6840 installation 422
LPKP-6840 operating modes..... 425
LPKP-6840 specifications 425
LPLR-911 439
LPLR-911 installation 441
LPLR-911 specifications 445
LPMR-1824,LPMR-1824 MC..... 433
LPMR-1824,LPMR-1824 MC installation 433
LPMR-1824,LPMR-1824 MC maximum read range 436
LPMR-1824,LPMR-1824 MC specifications..... 438
LPRKP-4600 429
LPRKP-4600 installation..... 429
LPRKP-4600 specifications 432
LPSP-6820..... 419
LPSP-6820 installation..... 419
LPSP-6820 specifications..... 422
LPSR-2400 426
LPSR-2400 installation..... 426
LPSR-2400 specifications 429
power 416
read range 415
readers..... 415
wiring..... 417
wiring requirements..... 416
LenelProx readers 413
LNL826S121NN,8-bit output..... 449
LPLR-911
surveillance zone 442
LPLRIN installation kit 445

M

Magnetic card access reader
configuration..... 390, 403
DIP switches..... 390, 404
grounding..... 391, 406
installation 388, 400
jumpers 390, 404
kepyad..... 400
keypad data..... 405
LEDs..... 391
maintenance..... 391, 407
mounting dimensions..... 394, 409
overview 387, 399
product identification..... 392, 407
reader verification..... 406
specifications..... 393, 408
standard format code 403
status..... 406
TTL interface..... 390, 405
verification..... 391
weatherproofing..... 388, 401

wiring 388, 400
WRI readers 405
Maintenance
biometric reader interface gateway 473
intelligent dual reader controller (2220) 126, 147
intelligent system controller (1000) 89
intelligent system controller (2000) 109
intelligent system controller (3300) 162
intelligent system controller (500) 70
magnetic card access reader 391, 407
Maximum read range 436
Memory backup battery
intelligent system controller (1000) 89
intelligent system controller (2000) 109
Memory expansion board
intelligent system controller (1000) 87
intelligent system controller (2000) 106
Micro 100 products 178
Micro serial server 171
Mounting
output control module (1200-U) 279
Mounting hardware 29

O

Open collector output 20
Output control module
baud rate 263
board components 256
configuration 262
device address 262
DIP switches 262
elevator control 260
installation 258
interfaces 255
jumpers 265
overview 255
power 260
relay outputs 259
specifications 267
unsupervised alarm inputs 258
upstream communication 258
wiring 258
Output control module (1200-U)
board components 276
configuration 273
device address 274
DIP switches 273
elevator control 284
installation 272
jumpers 275
LEDs 276
mounting 279
overview 271
power 285
relay outputs 282
specifications 287
unsupervised alarm inputs 281
upstream communication 282
wiring 281
Outputs 19
Overview 501

P

Power
AC 19
biometric reader interface gateway 467
DC 19
dual door controller module (1320-U) 368
dual reader interface module 341
input control module 225
input control module (1100-U) 249
inputs 19
intelligent dual reader controller (2220) 119, 141
intelligent system controller (1000) 83
intelligent system controller (2000) 101
intelligent system controller (3300) 156
intelligent system controller (500) 66
LenelProx 416
output control module 260
output control module (1200-U) 285
single door controller module (1300-U) 325
single reader interface module 298
star multiplexer 378
UL 49
wireless reader gateway 568, 586
Power inputs 19
Power requirements 24
Power requirements table 25
Processor address
intelligent system controller (1000) 84
intelligent system controller (2000) 102
intelligent system controller (500) 67

R

Read range 415
Reader data input 20
Reader inputs/outputs 20
Reader verification
magnetic card access reader 391
Reader weather shield 396
Reflex reader 502
Relay contact protection 41
Relay outputs 20
Relays

input control module 224
input control module (1100-U) 248
output control module 259
output control module (1200-U) 282
single door controller module (1300-U) 321
single reader interface module 296
RocketPort hub 210
RS-232
interfaces 23
wiring 40
RS-485
cable 22
communication overview 20
signal ground (SG) 36
wiring 37

S

Safety ground 36
SDS1100 ..... 185, 188
SDS2100 188
Securcomm uniflex dc336 modem 207
Security enhancements 177
Series 1 29
Signal ground (SG) 22
Single door controller module (1300-U)
cabinet tamper 325
device address 312
downstream reader communication 322
elevator control 324
installation 319
jumpers 313, 317
LEDs 314
overview 309
power 325
relay outputs 321
specifications 327
supervised alarm inputs 319
upstream controller communication 320
wiring 319
Single reader interface module
board components 292
cabinet tamper 303
configuration 301
device address 302
downstream reader communication 297
elevator control 299
eol termination 304
installation 294
interfaces 291, 331
jumpers 301
LEDs 292, 333
overview 291
power 298
relay outputs 296
specifications 305
supervised alarm inputs 294
upstream controller communication 295
wiring 294
Smart card
bioscrypt settings 538
encoding 504
Star multiplexer
board components 376
configuration 381
DIP switches 381
downstream device communication 378
installation 377
interfaces 375
jumpers 382
LEDs 376
overview 375
power 378
specifications 383
termination 379
upstream controller communication 377
wiring 377
Supervised alarm inputs
dual door controller module (1320-U) 364
dual reader interface module 335
single reader interface module 294
supervised alarm inputs
single door controller module (1300-U) 319
Supervised alarms 20
Supported biometric readers 474
Surveillance zone 442
System turn-up considerations 43
System wiring
considerations 24
current overload 24
device placement 24
power requirements 24

T

Tamper monitor signaling 405
Troubleshooting 54, 178
TTL interface 390, 405

U

U.S. robotics modem 206
UDS-10 190
UDS100 190
UDS1100 190
UDS200 190
UL
certified installations 47
power 49

typical combinations 49
Unsupervised alarm inputs
dual door controller module (1320-U)..... 368
input control module (1100-U)..... 245
intelligent system controller (1000)..... 77
intelligent system controller (2000)..... 95
intelligent system controller (500)..... 61
output control module..... 258
output control module (1200-U)..... 281
power fault,cabinet tamper monitors
biometric reader interface..... 465
wireless reader gateway..... 566, 584
Unsupervised alarms..... 20
Upstream
dual door controller module (1320-U)..... 364
dual reader interface module 337
input control module..... 223
intelligent system controller (1000)..... 77
intelligent system controller (2000)..... 95
intelligent system controller (500)..... 61
output control module..... 258
output control module (1200-U)..... 282
single door controller module (1300-U).... 320
single reader interface module..... 295
star multiplexer 377

V

Verification
biometric reader interface gateway..... 473
HandKey readers 485
intelligent system controller (1000)..... 89
intelligent system controller (2000)..... 109
intelligent system controller (500)..... 70
V-Series firmware..... 524
V-Station options 553
V-StationA-G..... 548
V-StationA-H..... 548

W

Weather shield 41, 396, 411
Weatherproofing 40, 388, 401
Wireless configuration..... 573, 591
Wireless reader gateway
baud rate..... 571, 589
configuration..... 570, 588
DIP switches 570, 588
downstream baud rate..... 572, 590
downstream device communication . 568, 586
firmware..... 572, 590
installation 566, 584
interface address 570, 588
interfaces..... 565, 583
jumpers 572, 590
overview 565, 583
power 568, 586
specifications 579, 605
unsupervised alarm inputs 566, 584
upstream host communication..... 566, 584
wiring..... 566, 584
Wiring
biometric reader interface gateway..... 465
command keypad..... 613
custom DB25 serial cable 193
dual door controller module (1320-U)..... 363
dual reader interface module 335
input control module..... 222
input control module (1100-U)..... 244
intelligent system controller (1000)..... 77
intelligent system controller (2000)..... 95
intelligent system controller (3300)..... 155
intelligent system controller (500)..... 61
LenelProx..... 417
magnetic card access reader 388, 400
output control module..... 258
output control module (1200-U)..... 281
single door controller module (1300-U).... 319
single reader interface module..... 294
star multiplexer..... 377
wireless reader gateway..... 566, 584
Wiring requirements 416

Lenel Systems International, Inc.
1212 Pittsford-Victor Road
Pittsford, New York 14534 USA
Tel 585.248.9720 Fax 585.248.9185
www.lenel.com
docfeedback@lenel.com

www.lenel.com

A UTC Fire & Security Company